DOCUMENT RESUME

ED 385 682 CE 068 577

TITLE Introduction to Carpentry. Instructor Edition. Introduction to Construction Series.

INSTITUTION Associated General Contractors of America, Washington, D.C.; Oklahoma State Dept. of Vocational and Technical Education, Stillwater. Curriculum and Instructional Materials Center.

PUB DATE 94

NOTE 303p.; For earlier version, see ED 301 719; for other documents in this series, see ED 306 392 and CE 068 575-589.

AVAILABLE FROM Curriculum and Instructional Materials Center, Oklahoma Department of Vocational and Technical Education, 1500 West Seventh Avenue, Stillwater, OK 74074-4364.

PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.

DESCRIPTORS *Basic Skills; Behavioral Objectives; *Building Trades; Career Exploration; *Carpentry; Classroom Techniques; *Competency Based Education; Construction Materials; Equipment Utilization; Hand Tools; Integrated Curriculum; Learning Activities; Machine Tools; Metal Working; Safety; Secondary Education; Skilled Occupations; Teaching Guides; *Trade and Industrial Education

ABSTRACT

This instructor's guide contains the materials required to teach a competency-based introductory course in carpentry to students who have chosen to explore careers in construction. The following topics are covered in the course's three instructional units: carpentry materials, carpentry tools, and applied skills. Each unit contains some or all of the following: objective sheets, suggested activities, supplemental information/activities to be presented at the instructor's discretion, information sheets, sheets of supplementary information to assist students in solving problems, transparency masters, instructional supplements containing suggestions for teaching basic skills, assignment sheets, job sheets, practical tests, written tests, and answers to assignment sheets and tests. Academic skills training is combined with vocational training throughout the instructional materials, and a system of icons has been used to help instructors identify activities into which training in the following basic skill areas has been infused: reading, science, creative thinking/problem solving, writing, oral communication, employability, math, interpersonal skills, and social studies. Most units of instruction are designed for use in more than one lesson or class period of instruction. These materials precede the instructional units: information on basic skills in curriculum, information on measuring student performance gains, and required criteria for a competency-based education program. A competency profile and basic skills matrix are included. (MN)

ED 385 682

introduction to construction series

introduction to carpentry

BEST COPY AVAILABLE

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA

votech

PERMISSION TO REPRODUCE THIS MATERIAL IN **OTHER THAN PAPER COPY** HAS BEEN GRANTED BY

B Brazier

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

instructor edition

CE 068 577

94-010508

Introduction To Carpentry

Developed as a Cooperative Project by
the Associated General Contractors of America
William W. Brown, Chairman, Manpower and Training Committee
and
Curriculum and Instructional Materials Center,
Oklahoma Department of Vocational and Technical Education

94-010508

Copyright 1994

Associated General Contractors of America
and the Oklahoma Department of Vocational and Technical Education
Curriculum and Instructional Materials Center

All rights reserved.

Printed in the United States of America by the
Oklahoma Department of Vocational and Technical Education
Stillwater, Oklahoma 74074-4364

This publication, or parts thereof, may not be reproduced in any form by photographic, electrostatic, mechanical, or any other methods for any use including information storage and retrieval, without written permission from the publisher.

The Oklahoma Department of Vocational and Technical Education does not discriminate on the basis or race, creed, color, national origin, sex, age, veteran status, or qualified handicap.

Introduction To Carpentry

TABLE OF CONTENTS

Volume A - Introduction To Carpentry

Unit 1 - Carpentry Materials

Unit 2 - Carpentry Tools

Unit 3 - Applied Skills

FOREWORD

In 1985, The Associated General Contractors of America (AGC) met with representatives of the Oklahoma Curriculum and Instructional Materials Center (CIMC) to discuss the possibilities of developing, as a cooperative project a course of instruction designed for training individuals who choose to seriously explore careers in carpentry.

This revised publication is the result of those original discussions and updates made through close coordination among general contractors and vocational educators. This series represents conscious effort to coordinate the practical experience of personnel in the carpentry industry with the best instructional methods of those in the field of vocational education.

Although this book reflects a systematic approach to instructional materials development and the latest in educational technology innovations, the information in the Introduction To Carpentry manual should be adapted and modified to coincide with local conditions.

Roy Peters, Jr.
State Director
Oklahoma Department of Vocational
and Technical Education

William. W. Brown, Chairman
Manpower and Training Committee
The Associated General Contractors
of America

PREFACE

Carpentry requires that students have many skills and related information to become productive workers in this challenging field. Workers must be better trained and equipped to find and retain meaningful employment.

Instructional materials in this manual is written in terms of student performance, using measurable behavioral learning process. Criterion-referenced evaluation instrument provide for a uniform measurement of student progress.

The purpose of this manual is to assist instructors in all carpentry related areas in providing instruction throughout the industry. Any information in this manual that does not concur with the instructor's course of study should be modified to meet personal needs.

Personnel safety is of prime concern, as an instructor you are encouraged to closely observe and couch students in all safety issues. We have done much to advise students of possible dangers, but your close supervision and alertness can't be overemphasized.

Al Willey
Curriculum and Instructional
Materials Center
Oklahoma Department of Vocational
and Technical Education

ACKNOWLEDGEMENTS

Much appreciation is expressed to the many individuals who contributed their time, talents, and knowledge in the revision of this manual.

Thank you to the following ad hoc committee members, AGC staff representatives, and the staff of the Oklahoma Department of Vocational and Technical Education.

John Friedemann
CIMC Coordinator
Stillwater, OK

William W. Brown, Chairman
Manpower and Training Committee
The Associated General Contractors of America

AGC Committee Members

Robert Siess
Tarlton Corporation
St. Louis, MO

E.A. Proetke
Dunedin, FL

Ralph E. Eggleston
Jaynes Corporation
Albuquerque, NM

John Heffner
AGC - Manpower and Training Services
Washington, DC

Edward J. Hynds, Jr.
English Brothers Co. Inc.
Champaign, IL

Len Toenjes
Construction Training School
St. Louis, MO

Fernando Zamarron
H.B. Zachry Co.
San Antonio, TX

Preston Leckie
Flintco Inc.
San Antonio, TX

Oklahoma Committee Members

Larry Downey
Downey Construction
Edmond, OK

Greg McCrocklin
Manhattan Construction Co.
Tulsa, OK

Ken Russell
Ken Russell Co.
Tulsa, OK

Mike Lambert
Lambert Construction
Stillwater, OK

Oklahoma Department of Vocational and Technical Education Staff

Pam Stacey
AGC/CIMC Marketing

Lynna Ausburn
Development Coordinator

Kathleen Kincaid
Business Manger

Judith Armstrong
Contract Editor

Terri Tomson
Secretary

Darrel Stiles
Warehouse Manager

Bob Davis
Art Department

Margie Kirkendall
Word Processing Department

Brenna Tillman
CIMC - Publications Supervisor

Charlotte Tarkington
CIMC - Format Specialist

Al Willey
Instructional Development Specialist
CIMC - Oklahoma Department of Vocational and Technical Education

USE OF THIS PUBLICATION
INSTRUCTIONAL UNIT

Introduction to Carpentry contains three units. Each instructional unit includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for the instructor, extensions and options, information sheets, students supplements, transparency masters, instructional supplements, assignment sheets, job sheets, practical tests, written test, and answers to assignment sheets and written test, all of which are included in the instructor's edition. The student workbook includes the objective sheets, information sheets, student supplements, transparency masters, assignment sheets, and job sheets. Written tests may be duplicated for classroom use or *additional copies* may be purchased by calling 1-800-654-4502 or, in Oklahoma, 1-800-522-5810, ext. 589.

All of the unit components tie into measurable and observable learning outcomes. Instructors are encouraged to supplement these components with other resources in order to make them as responsive to local conditions and individual needs as possible.

Most units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the instructor will help him or her determine the following:

- Amount of material that can be covered in each class period.
- Skills that must be demonstrated.
  - Supplies and equipment needed
  - Amount of class time needed for demonstrations
  - Amount of time needed for student practice
- Supplementary materials, including print and non-print media, that must be ordered.
- Resource people who must be contacted.

Objective Sheet (White Pages)

Each unit of instruction is based on the performance needed for successful employment in an occupational area. Performance objectives are stated in two forms. The unit objectives states the overall goal of the unit. It tells what the student should be able to do and what standard will be used to see whether the student can do it. Specific objectives outline the teaching sequence of the competencies required to meet the unit objective.

The objectives should be provided for students and stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods. Instructors should prepare for each unit by deciding how each objective could be best taught.

Instructors should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the instructor should remember to supply the needed information, assignment and/or job sheets, and criterion-referenced test items.

Suggested Activities (Pink Pages) – **Instructor's Edition only**

The suggested activities page assists the instructor during the preparation stage of the teaching/learning process by providing suggestions for delivery, application, and evaluation during the instructional process. The instructor should read the suggested activities prior to introducing the unit to allow time to obtain supplemental materials, prepare audiovisual materials, and contact outside resources. Duties of the instructor will vary according to the particular unit.

References used in the development of each unit are listed in the "Suggested Resources" section, along with print and non-print media that may be used to teach the unit. These materials can be used by the instructor to supplement his or her knowledge of the subject area or to help students with particular interests or occupational objectives in the area covered.

Extensions and Options (White Pages) – **Instructor's Edition only**

Extensions and Options are supplemental material that is not testable or graded and is nice-to-know. Extensions and Options provide the instructor with additional activities, fact sheets, art, controversial items, and extra practice sheets. They may also include items for the gifted or remedial student. Extensions and Options are used at the discretion of the instructor.

Information Sheets (Green Pages)

The information sheet provides "must know" content essential for meeting the cognitive objectives stated at the beginning of each unit. It serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective.

Students should read the information sheet before it is discussed in class. Space is provided in margins for students and instructors to add notes that clarify and/or expand on the information provided.

The information sheet may include notes, cautions, or warnings. These should be discussed carefully and thoroughly. **Notes** are short verbal additions to the information sheet or procedural outline that provide nice-to-know and decision-making information. A note may tell the student what to watch for or to consider at a given step. It may explain when a step may not be applicable. Notes offer guidance that may help the student understand the process and do it more efficiently. **Cautions** are advisories that tell the student how to avoid causing minor personal injury or equipment damage. **Warnings** are advisories to the student used to avoid serious personal injury or death to the student, persons in the workplace, or users of the project or the procedure.

Student Supplement (Green Pages)

Student supplements include instructions that could be used for solving problems or reinforcing the enrichment of learning. The information presented in a student supplement may consist of tables, charts, written information, forms, or other information students will need in order to complete one or more of the assignment or job sheets. While supplements are not tested over directly, they may be used to assist in meeting the performance objectives.

Transparency Masters (White Pages) - **Instructor's Edition only**

Transparency masters provide information in a special way. The students may see as well as hear the materials being presented, thus reinforcing the learning process. Transparencies may present new information or they may reinforce information presented in the information or assignment sheets.

Transparencies should be made and placed in the notebook where they will be immediately available for use. Transparencies direct the class's attention to the topic of discussion. They should be left on the screen only when topics shown are under discussion.

Instructional Supplements (Pink Pages) — **Instructor's Edition only**

Instructional Supplements provide suggestions for teaching the basic skills included in each assignment sheet or job sheet. They are located directly in front of the components they support–assignment or job sheets–in each unit.

Assignment Sheets (Tan Pages)

Assignment sheets provide students with information and exercises that address learning levels at or above the application level of Bloom's taxonomy. Assignment sheets provide written exercises for instruction and practice of a specific objective. The introduction to the assignment sheet explains how the assignment sheet relates to the subject area and unit component for such information.

Assignment Sheet Answers (Pink Pages) – **Instructor's Edition only**

This component is designed to assist the instructor in evaluating student performance on assignment sheets.

Job Sheet (Blue Pages)

Job Sheets are another important segment of a unit of instruction. The job sheets provide a list of equipment, tools, and materials needed to complete a manipulative or psychomotor skill. They describe a step-by-step procedure to complete each task or job. Diagrams, photographs, and illustration are provided to assist students in achieving the skill.

The instructor should demonstrate the procedure outlined in each job sheet. Furthermore, the instructor needs to localize the procedure according to the equipment and supplies available in the local lab or salon situation. Job sheets also furnish potential employers with a picture of the skills being taught and the performances they might reasonably expect from a person who has had this vocational instruction.

Practical Tests (Yellow Pages) – **Instructor's Edition only**

The practical tests are designed to assist the instructor in the evaluation of the psychomotor activities (job sheets). The practical test provides instructors with a valid mechanism for determining a student's level of ability in performing the procedure stated on the job sheet. The check-off list allows instructors to evaluate a student's process performance of the task on the job sheet. The overall competency indicator allows the instructor to evaluate the end product.

Written Test (Yellow Pages) – **Instructor's Edition only**

This component provides criterion-referenced evaluation of every objective listed in the unit of instruction. If objectives have been added, deleted, or modified, appropriate changes should be made on the test.

In order to measure and document student competency gains as required by the latest Carl Perkins regulations, and as outlined in the Oklahoma-developed system of standards and measures, it is *absolutely essential* that the same test be used as a pretest and as a posttest. If you choose to use tests other than the ones included herein, be sure that the same instrument is used for each activity–pre- and post test.

A detailed explanation of the Oklahoma plan for standards and measures and the Carl Perkins requirements is included in the CIMC publication, *Measuring Learning & Competency Gain: The Pretest/Posttest Approach*. This booklet and accompanying software designed to assist in calculating and recording student gains are available to all vocational teachers through the school's vocational testing liaison.

To further assist vocational teachers, the CIMC is in the process of developing test code sheets for each written test in its more recent publications, including this one. These code sheets are explained in Section 8 of the publication mentioned above, and will greatly assist in verifying that the test is a valid instrument for measuring student learning and competency gains. As the test code sheets for programs become available, they will be forwarded to teachers of each program; further publications will include the test code sheets.

Written Test Answers (Pink Pages) – **Instructor's Edition only**

This component is designed to assist the instructor in evaluating student performance on written tests.

COMPETENCY PROFILES

A competency profile is available from CIMC Resale for each publication. Competency profiles document student performance. The profile contains a list of the specific job competencies that a student should achieve before leaving the training program.

PAGE NUMBERING

Each publication for the Curriculum and Instructional Materials Center is usually assigned a specific abbreviation. ***Introduction to Carpentry*** has not been abbreviated. Each unit will be recognized by the unit number in Arabic numerals. Each unit in the publication begins with page 1. Each page number gives the component name, book title, unit number, and page number within the unit. Since some CIMC publications are loose-leaf, this system of page numbering was recently adopted so that pages from different manuals would not get mixed up. The page number for the objective sheet in Introduction to Carpentry, which is unit 2, would look like this:

OBJECTIVE SHEET - **Introduction to Carpentry**
CIMC - A2 - 1

METHODS OF DISSEMINATING MATERIAL

For best results, provide student materials for each student. Student workbooks contain objective sheets, information sheets, supplements, transparency masters, assignment sheets, and job sheets. Pretest, practical tests, and written tests are packaged separately for students, and can be stored until needed. Students should be allowed to take their materials home at the end of the course.

TEACHING METHODS

Keeping students motivated is a challenge. Supplement the objectives by providing the "why," personal experiences, and current information. If you are going to teach the material in a group setting, prepare for the unit be deciding the best way to teach each objective and allow for student input.

If you are going to follow the plan for individualized instruction, provide opportunities that will allow each student to become involved in planning for and being responsible for his or her own education.

CORRECTIONS AND SUGGESTIONS

The Curriculum and Instructional Materials Center (CIMC) wants to provide vocational instructors and students with materials that are accurate and effective. Although the CIMC strives to maintain the highest standards of development and production, oversights occasionally do occur. If you find any errors in this or other CIMC publications, or have suggestions for improving their usefulness in vocational programs, please notify the CIMC staff. One easy way of pointing out errors is to make a photocopy of the affected page and to indicate the correction on the copy. Mail this information to the CIMC, where it will be used to correct the publication before the materials are reprinted.

To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible after discovering the error. Do not assume that someone else will notice the error and inform the CIMC; other users may be making the same assumption. Please send corrections and recommendations for improving this publication to the following address:

Coordinator of Development
Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and
Technical Education
1500 West Seventh Avenue
Stillwater, Oklahoma 74074-4364

For a free catalog, a list of new publications, or other instructional materials information call 1-800-522-5810, extension 589.

RESALE

BASIC SKILLS IN CURRICULUM

The CIMC has always been mindful of the importance of reinforcement (and sometimes remediation) of students' academic skills as they progress through vocational training, and has always included activities in its materials to enhance and promote use of these skills.

Recent state and federal legislation mandates vigorous basic skills development in vocational education in the wake of demands by industry that workers *must* be academically, as well as technically, competent, given the nature of the highly complex work place. In response, the CIMC has taken the following steps to document that, indeed, the instructional materials *do* combine academic skills training with the vocational training. In addition, concerted efforts have been made to "beef up," or enhance the basic skills instruction already present. Following is a brief description of those processes:

Basic Skills Icons and Enablers

To assist teachers and students in identifying activities that promote basic skills development, the CIMC has implemented a marking system that uses simple graphic symbols, or icons, and a list of specific tasks, or enablers, to identify the basic skill or skills that are called for in each job or assignment sheet.

Each of the nine broad skills areas—reading, writing, mathematics, science, oral communication, interpersonal or relating, creative thinking and problem solving, employability, and social studies—is represented by the icon presented below.

Reading

Science

Creative Thinking/ Problem Solving

Writing

Oral Communication

Employability

Math

Interpersonal or Relating

Social Studies

When an activity involving one of these basic skills is identified, the corresponding icon is placed in the left-hand margin of the job or assignment sheet. The basic skills training is further defined by retrieving the specific, or enabling, skill that is required by consulting a list of over two hundred and fifty enablers that has been compiled and grouped with each general basic skill. This enabling skill is placed directly below the icon.

As an example, an exercise that requires a student to conduct library research would make necessary the use of specific reading comprehension and research and reference skills. The basic skills that the exercise promotes would be depicted in the left-hand margin as follows:

ASSIGNMENT SHEET | ***PLANNING LIVING SPACE FOR HUMAN NEEDS*** | **1.**

Name _____ Score _____

OBJECTIVE 10 **Define personal territory.**

INSTRUCTIONS

Reading Comprehension
- Gain factual information

Functional Reading
- Follow written instructions
- Use content area vocabulary

Language
- Use standard grammar, spelling, and capitalization
- State ideas clearly

- As discussed in Objective 1, each person has an invisible "space bubble" or comfort zone. A comfort zone is the space between oneself and others that brings a feeling of well-being. When one's comfort zone is crowded or invaded, discomfort often results. Therefore, personal territory needs should be a prime consideration when planning living space.
- For each of the following situations, draw your estimated comfort zone around the figures provided.
- Indicate how many inches from your body the comfort zone extends.
- Consider how that comfort zone changes in different situations. Answer the questions that follow.

Basic Skills Documentation Matrix

Another component of the CIMC basic skills instructional plan is the "Basic Skills Documentation Matrix." The matrix graphically summarizes the basic skills training included in the vocational program, unit by unit. It should be helpful to teachers in planning their instruction, and to administrators as documentation that basic skills **are** being addressed during the vocational training.

The matrix for this publication is included as an 8½" by 11" foldout in this *Instructor's Manual*.

Matrices have been developed for most CIMC publications. For more information on those available for other programs, call the CIMC at 1-800-654-4502.

Instructional Supplement

The supplement is a tool for the instructor to use in helping students apply the basic skills in Assignment Sheets and Job Sheets. Some supplements are appropriate for use with all students; some are for use only with those students who do not understand the academic skills called for in the exercise.

MEASURING STUDENT PERFORMANCE GAINS

When you examine this book, you will notice that separate written pretests are no longer included in the units of instruction. Each CIMC unit now contains only a single Written Test. This test should be used as **both** pretest and posttest by giving it once before students start a unit and again when they have completed the unit.

The reason for using a single instrument as both pretest and posttest is so that direct comparison of each student's competencies before and after instruction can be made accurately. This comparison enables precise calculation, documentation, and evaluation of student **performance gains**.

Accurate performance gains analysis is an important requirement of the new Carl Perkins legislation for vocational education. Teachers can make an important contribution to the performance accountability mandated by the new federal legislation by carrying out accurate performance gains analysis for their students, and making this data available to students, parents, and administrators.

This analysis is easy to do and requires only simple calculations and record keeping. Detailed information regarding performance gains analysis is contained in the CIMC publication, *Measuring Learning & Competency Gains: The Pretest/Posttest Approach.* In addition, the CIMC has developed a computer program, CARL, which will perform all necessary calculations and will print out a record form of all information required for gain score analysis. Copies of CARL and the publication are available through your local testing liaison (in Oklahoma), or from the CIMC at 1-800-654-4502.

REQUIRED CRITERIA FOR A COMPETENCY-BASED EDUCATION PROGRAM

Criterion	Discussion	CIMC component meeting criterion
1. Instruction is based on clearly-stated learning objectives that are: a) observable and measurable, and b) communicated in writing to students before instruction begins.	Learning objectives drive CBE. Objectives are the "competencies" that learners must achieve. Each objective must clearly state what *learners* must *do* to demonstrate acquired skill or knowledge. Verbs in learning objectives are active and precise, stating the exact performance expected of learners. The objectives should also specify the standard or level of performance required. Objectives can be at any level of Bloom's Taxonomy and can include the cognitive, psychomotor, and affective domains. Higher-order cognitive skills should be included.	Objective Sheet
2. Instruction is aligned with the stated learning objectives	In CBE, the objectives specify what is taught. "Content" should relate to one or more objectives. The curriculum should cover all objectives with relevant information.	Information Sheet
3. There is a student evaluation system that is: a) criterion-referenced, and b) aligned to the learning objectives and the curriculum.	In CBE, the aim is to bring the performance of *all* learners up to a pre-defined standards and competencies. Learners work on each competency until they achieve "mastery"; the evaluation system should test and record this mastery. Learners can restudy and retest as often as needed. Specific remediation activities should also be available to learners when needed. The evaluation system focuses on what each student has achieved, not on what the instructor has "taught." The "constant" in CBE is student performance; the "variables" are time and resources. (This differs from traditional systems where learners get one chance at mastery; some succeed and some fail. In such systems, time and resources are constant and student achievement is variable.) If an evaluation is criterion-referenced, successful learner performance is defined by (or *referenced* to) mastery of pre-set objectives and standards (or *criteria*); there must be a careful match (or *alignment*) between what the student should master (objectives), what is taught (curriculum), and what is tested. Objectives, curriculum, and evaluation system must all match.	Written Test and Job Sheet/Skill Test

Criterion	Discussion	CIMC component meeting criterion
4. There is an observable management system of cognitive skill practice that provides for, promotes, and documents mastery learning.	For both cognitive and psychomotor skills, a CBE program must have a system of maintaining records of which skills and activities each learner has completed, which ones are in progress, and which ones have not yet been completed. Completion means "mastery"; no skill is completed until the learner has achieved the mastery level. The record system should promote feedback on student skill attainment to *both* instructor and learners, provide for remediation as needed, and encourage reevaluation of learner performance until mastery is achieved. Appropriate remediation strategies often should consider learning styles and other individual differences among learners. Learners should work on skills and activities until they achieve mastery. They should not be "passed on" without mastery. While learners may move ahead and work on other skills (i.e those for which all prerequisite skills have been mastered or those without prerequisites), work should also continue on the skills still requiring mastery. Students should not attempt higher-order skills until all prerequisite skills are mastered.	Assignment Sheet
5. There is an observable management system of psychomotor skill practice that provides for, promotes, and documents mastery learning.		Job Sheet/Skill Test
6. Skill mastery records are maintained for each learner, and learners have access to and make use of these records to monitor their skill acquisition.	Records should clearly indicate the skills each learner has mastered. One such record should profile or list the competencies that have been mastered and those to be mastered. Other performance indicators can be added and kept in a portfolio for each learner. Learners should have ready access to their portfolios to monitor their own progress in skill mastery and competency attainment.	Competency Profile

CORRECTIONS AND SUGGESTIONS

The Curriculum and Instructional Materials Center (CIMC) wants to provide vocational instructors and students with accurate and effective materials. Although the CIMC strives to maintain the highest standards of development and production, oversights sometimes do occur. If you find any errors in this or other CIMC publications, or have suggestions for improving their usefulness in vocational programs, please notify the CIMC staff. To do this, please identify the page(s) affected and write any comments to clarify the error or suggestion. Use the spaces below. Then, simply fold (bottom of page *upward*, top *downward*), secure, and mail.

This information will be used to correct the publication before the materials are reprinted. To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible after discovering the error.

2 Fold downward

Page: Comment:

____ _____

____ _____

____ _____

____ _____

____ _____

1 Fold upward

PLACE
STAMP
HERE

OKLAHOMA DEPARTMENT OF
VOCATIONAL AND TECHNICAL EDUCATION/CIMC
1500 W. 7TH AVE
STILLWATER OK 74074-9907

26

OBJECTIVE SHEET	CARPENTRY MATERIALS	A 1

INTRODUCTION

There are hundreds of material types used in carpentry. This unit describes the uses of lumber and commonly used hardware fasteners.

Lumber is the term given to wood after it has been cut into uniform pieces. The carpenter must have a good understanding of lumber and fastening devices.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVES

After completing this unit, the student will be able to list common softwood, hardwood, and plywood grades, and match common hardwoods and softwoods to their uses. The student will show this knowledge by completing assignment sheets and written test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After competing this unit, the student will be able to:

1. Given a list of terms associated with wood products, match them to their correct definitions.
2. Given a list of alternatives, identify wood characteristics by their definitions or by their representative drawings.
3. Given alternatives, match the type of wood to its correct use.
4. Differentiate between the various grades of wood.
5. Given a description, differentiate plywood types and grades.
6. Given a brief description, match types of wood paneling.
7. Provided a drawing, select the various types of trim and molding.
8. Given pictures, identify common fasteners and their primary uses.

9. Compute lumber quantities. (Assignment Sheet 1)

10. Write a lumber requisition. (Assignment Sheet 2)

CARPENTRY MATERIALS A 1

PREPARATION

- Review unit and plan presentation.
- Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of the unit.
- Order or obtain materials listed in suggested resources.
- Order other materials to supplement unit.

  EXAMPLES: Samples of various lumber species and qualities; samples of lumber that show different grades, sawing methods, drying methods and surface finishes; samples of paneling, trim and molding

  NOTE: Sample chips are available from most lumber companies.

DELIVERY

Objective 1: Given a list of terms associated with wood products, match them to their correct definitions.

- Show students examples to illustrate appropriate terms.
- Explain how knowing the terms and definitions will help the students to better understand this unit and lumber.
- Show films that are available on the different types of wood and wood products.

Objective 2: Given a list of alternatives, identify wood characteristics by their definitions or by their representative drawings.

- Discuss characteristics to consider in using lumber.
- Use Transparency Master to illustrate clear cutting.
- Show students a sample of lumber and point out each of the characteristics listed.

- Discuss common defects in lumber.
- Show students actual examples of each defect.
- Lay out samples of lumber containing defects, and have students identify the type of defect in each.
- Discuss actual and nominal sizes of lumber.
- Make a set of flash cards and have students work in teams, giving actual sizes for nominal sizes.

Objective 3: Given alternatives, match the type of wood to its correct use.

- Discuss the uses of common softwoods and hardwoods.
- Take students to a lumber yard and then to a fine furniture store so that they can compare unfinished and finished woods and see some of their uses.
- Provide students with a set of wood chips so that they may familiarize themselves with the different wood types.
- Make a game of identifying different woods. Lay out the wood chips at different stations and have students identify them. After they have identified the type of wood, have them list as many uses as possible for each type. This game could also be set up competitively, with the students divided into two teams.
- Have students survey their homes and list all the different types of wood and how they are used.

Objective 4: Differentiate between the various grades of wood.

- Discuss different grades and grading systems for hardwood and softwood using Information Sheet and Student Supplement 1.
- Take students on a field trip to a lumber mill or lumberyard so that they can see how the various types of lumber are graded.

- Lay out various grades of lumber and have students identify the grade of each piece.

Objective 5: Given a description, differentiate plywood types and grades.

- Invite a representative from APA (American Plywood Association) to speak to the class.
- Refer students with copies of Supplements 2 and 3 to use for future reference.

Objective 6: Given a brief description, match types of wood paneling.

- Show students samples of each type of core construction.
- Discuss the different types of core, how, and why they are used.
- Show students samples of different types of paneling.

Objective 7: Provided a drawing, select the various types of trim and molding.

- Discuss the various types of paneling.
- Have students survey their homes and list all the types of trim and molding used.
- Lay out samples of the types of trim and molding listed in the information and have students identify each type.

Objective 8: Given pictures, identify common fasteners and their primary uses.

- Use Transparency Masters 2 and 3 to discuss nail types.

APPLICATION

Objective 9: Compute lumber quantities. (Assignment Sheet 1)

- Show students examples of units of measurements for various types of lumber.

  EXAMPLES: One board foot (1″ × 12″ × 12″) of dimension lumber; one square foot of plywood; one lineal foot of trim

- Discuss units of measurements for various types of lumber.
- Use Assignment Sheet 1 to give students practice in computing lumber quantities.

Objective 10: Write a lumber requisition. (Assignment Sheet 2)

- Use Assignment Sheet 2 to give students practice in writing lumber requisitions.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements from pretest results.
- Counsel students individually on pretest results and study requirements.
- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.
- Evaluate students on job sheet activities.
- Complete appropriate section of competency profiles.
- Reteach and reevaluate if necessary.

- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Evaluate students on assignment sheet activities.

  NOTE: The written test may be given in sections if desired.
- Give the written test.
- Reteach and retest as necessary.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

NOTE: The following companies have up-to-date films and/or publications on lumber and wood products.

- Appalachian Hardwood Manufacturers, Inc., P.O. Box 427, High Point, NC 27261, (919) 885-8315.
- Fine Hardwoods/American Walnut Association, 5603 West Raymond Street, Suite D, Indianapolis, IN 46241, (317) 244-3311.
- Hardwood Manufacturers Assn. National Oak Floor Manufacturers Assn. Southern Cypress Association, 805 Sterick Bldg., Memphis, TN 38103, (901) 525-8221.
- Western Wood Products Association, 1500 Yean Building, Portland, OR 97204, (503) 224-3930.
- California Redwood Association, 591 Redwood Hwy., Suite 3100, Mill Valley, CA 94941, (415) 381-1304.

- American Plywood Association, P.O. Box 11700, Tacoma, WA 98411-0700, (206) 565-6600
- Hardwood Plywood Manufacturers Association, 1825 Michael Faraday Drive, Reston, VA 22090-2789, (703) 435-2900.
- Frank Paxton Company, 9229 Ward Parkway, Kansas City, MO 64119, (816) 361-7110.
- National Particle Board Association, 2306 Perkins Place, Silver Spring, MD 20910.
- Architectural Woodwork Institute, 2310 S. Walter Reed Drive, Arlington, VA 22206.

UNIT REFERENCES

- *How to Specify and Buy Industrial Arts Lumber and Plywood.* Paxton/Patterson, Frank Paxton Lumber Company, Chicago, IL.
- "Labels from Wood Chips." Paxton/Patterson, Frank Paxton Lumber Company, : Chicago, IL. n.d.
- "Moulding Chart." Southwest Moulding Co.,.: Dallas, TX.. n.d.
- "Paxton Beautiful Woods." Frank Paxton Lumber Company: Oklahoma City, OK.
- *Product Use Manual.* Western Wood Products Association: Portland, OR.
- Wagner, Willis H. *Modern Carpentry.* The Goodheart-Wilcox Company, Inc.: South Holland, Illinois.
- Willey, Al. *Commercial Carpentry.* Department of Vocational and Technical Education/Curriculum and Instructional Materials Center and The Associated General Contractors of America, Stillwater, OK 74074.

INFORMATION SHEET	CARPENTRY MATERIALS	A 1

OBJECTIVE 1

Given a list of terms associated with wood products, match them to their correct definitions.

- **actual size** — the physical measurements of lumber after drying and shaping
- **beam** — horizontal member that supports loads over an opening; made of a single unit of concrete, wood, stone, iron, or other structural material
- **clear cutting** — process of removing waste from boards
- **core** — inner layers of fillers in plywood
- **hardwood** — wood produced from any of the groups of trees that have broad leaves, in contrast to conifers or needle-bearing trees

  NOTE: The term *hardwood* has no reference to the actual hardness of the wood.
- **heartwood** — central part of tree trunk between pith and sapwood, consisting of dark, mature wood in which little further color change will occur
- **kiln-dried** — dried in a heated enclosure
- **joist** — horizontal support members used to attach flooring and ceiling material
- **load-bearing wall** — structure that supports a weight exerted from above
- **lumber** — any material, such as boards, planks, or beams, cut from timber to a size and form suitable for marketing
- **lumber grades** — standards established by the national grading rule committee and the National Hardwood Lumber Association to ensure quality lumber (Examples: No 1, economy)

- **molding** — narrow strip of wood, usually shaped to a curved profile throughout its length; used for ornamentation and to conceal surface joints

- **nominal size** — used to indicate the size of material before final processing

- **oriented strand board** — three-ply wood panels used for subflooring and sheathing

- **pier** — a vertical support set into the ground and bearing upper structural members

- **plate** — horizontal framing member at the top or bottom to which studs are attached

- **pressure treated wood** — wood that has had preservatives forced into their fibers as a protection against insects or moisture

- **plywood** — fabricated wood product constructed of three or more layers of veneer joined with glue; layers are usually at right angles to each other

- **rafter** — on a roof, sloped structural member that support roof sheathing and loads

- **sapwood** — light-colored wood growing between heartwood and bark

- **shiplap siding** — exterior wall covering in which the edges are fitted to overlap one another

- **sill** — lowest horizontal framing member in a wall opening or lowest member attached to the foundation and supporting other members

- **softwood** — wood produced from needle or cone-bearing trees

  NOTE: The term *softwood* has no reference to the actual softness of the wood.

- **SAS** — lumber grade—smooth—four sides
- **stringer** — beam that rests on other supports, such as a joist or beam
- **stud** — vertical wood or metal framing members in a wall; usually a 2×4 or 2×6
- **surfaced wood** — wood that has been dressed by planing to attain a smooth surface and uniform size
- **truss** — structural member formed by triangular arrangement of lumber; usually used to support a roof
- **veneer** — thin layer or sheet of wood glued to another base material
- **wood preservatives** — substances used to poison wood as protection from fungi or insects or to reduce water damage to wood

OBJECTIVE 2

Given a list of alternatives, identify wood characteristics by their definitions or by their representative drawings.

- **Kind of wood**

  Woods are classified as hard or soft, but that classification has more to do with the type of tree than the actual hardness of the wood. A builder may want to use a particular species of wood—such as redwood, cedar, or yellow pine—for a specific purpose based on the appearance or other characteristics of that type of wood.

- **Grade**

  Lumber is graded based on its strength, appearance, number of defects, and other factors. Methods of grading are outlined by the American Lumber Standards Committee and the American Wood Working Institute. Detailed lists of grades and standards are developed by the various lumber producers' associations, such as Southern Pine Inspection Bureau, California Redwood Association, Western Wood Products

Association, and others. Hardwood grades are regulated by the National Hardwood Lumber Association.

- **Size**

  Lumber products come in standard sizes based on width, thickness, and length. Size may be *actual* or *nominal*. Nominal size is the size of the material before final processing and tends to be larger than the actual size after drying and shaping.

  NOTE: The sizes given in Tables 1 and 2 are the most common widths and thicknesses of lumber. Standard lengths come in 2-foot increments beginning with 8 feet and going up to 20 feet—that is, 8′, 10′, 12′, 14′, 16′, 18′, 20′ . Most suppliers can special-order lengths over 20 feet. Length is generally an actual measurement. The width and thickness are nominal measurements.

TABLE 1

Nominal and actual softwood lumber sizes

Nominal (rough)	Actual (S4S)
1″ × 4″	¾″ × 3½″
1″ × 6″	¾″ × 5½″
1″ × 8″	¾″ × 7¼″
1″ × 10″	¾″ × 9¼″
1″ × 12″	¾″ × 11¼″
2″ × 4″	1½″ × 3½″
2″ × 6″	1½″ × 5½″
2″ × 8″	1½″ × 7¼″
2″ × 10″	1½″ × 9¼″
2″ × 12″	1½″ × 11¼″
4″ × 4″	3½″ × 3½″
4″ × 6″	3½″ × 5½″

TABLE 3

Nominal and actual hardwood lumber sizes

Nominal (rough)	Actual (S2S) plain	Actual (S2S) quartered
1/2"	5/16"	5/16"
5/8"	7/16"	7/16"
3/4"	9/16"	9/16"
1"	25/32"	25/32"
1 1/4"	1 1/16"	1 1/32"
1 1/2"	1 5/16"	1 9/32"
2"	1 3/4"	1 11/16"
2 1/2"	2 1/4"	2 1/4"
3"	2 3/4"	2 3/4"
4"	3 3/4"	3 3/4"

- **Sawing method**

  - Most trees are sawed so that the growth rings form an angle of less than 45 degrees with the surface of the boards produced. Such lumber is called *flat-grained* in softwoods or *plain-sawed* in hardwoods. Wood that is cut with the growth rings at an angle greater than 45 degrees is called *edge-grained* in softwoods and *quarter-sawed* in hardwoods.

FIGURE 1

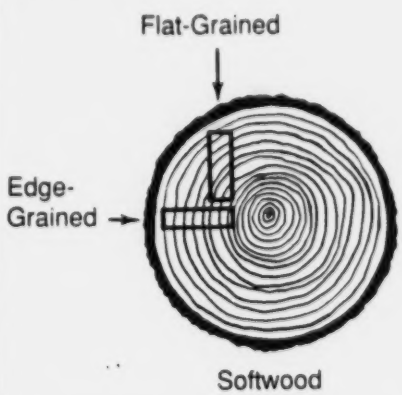
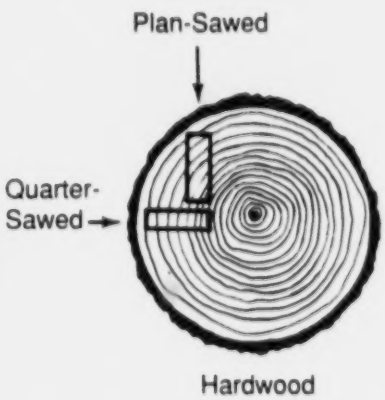


FIGURE 2



- **Drying method**

  Lumber is dried to reduce its weight, to decrease shrinkage, and to improve usability. A number of considerations go into determining the correct moisture content for lumber. Generally, all the carpenter need understand is that green lumber—that is, lumber that has not been dried and with a moisture content of over 20 percent—will shrink more than air-dried or kiln-dried lumber.

- **Surface finish**

  Lumber producers plane wood to give a smooth finish to one or more surfaces for specific purposes. Lumber may be rough, with no finished surfaces; smooth-one-side [S1S], with one wide surface planed; smooth-two-sides [S2S] with both wide surfaces planed; or smooth-four-sides [S4S] with all surfaces planed.

- **Lumber defects**

  — Warps

  a. Crook

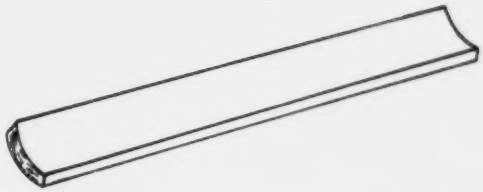
FIGURE 3

b. Bow

FIGURE 4

c. Cup

FIGURE 5

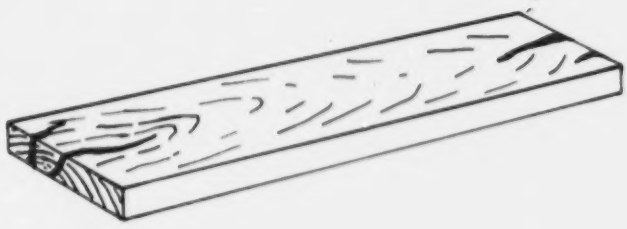


d. Twist or wind

FIGURE 6

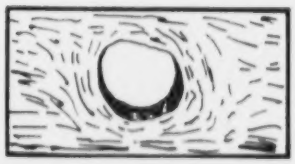
— Checks

FIGURE 7



— Knots/knothole

FIGURE 8



OBJECTIVE 3

Given alternatives, match the type of wood to its correct use.

- **Softwoods**

  — **Aromatic red cedar and incense cedar** — closet linings, fence posts, paneling, interior and exterior trim, and decking

  — **Western red cedar** — shingles and shakes, lumber, poles, posts, piles, and exterior siding

  — **Bald and pecky cypress** — millwork, planing-mill products, tanks, silos, exterior and interior trim, siding and shingles, sound-proof and rustic paneling

  NOTE: The pitted holes in pecky cypress make it a good material for sound-proofing paneling.

  — **Douglas and white fir** — construction lumber, plywood, veneers, planing-mill products, timbers, tanks, silos, trim, moldings, cabinets, flooring, doors, and sashes

  NOTE: Douglas fir is one of our most valuable timber trees.

  — **Western hemlock** — millwork products such as doors and windows, utility lumber, plywood, cabinets, and trim

  — **Larch** — utility lumber, plywood, veneers, planing-mill products, trim, moldings, cabinets, and flooring

— **Ponderosa, white, and yellow pine** — planing-mill products, cabinets, trim, molding, plywood, paneling, door panels, subflooring, sheathing, shelving, and utility lumber

NOTE: The pines are probably the most valuable group of timber trees in the world. They not only supply wood and pulp, but also supply natural resins including spirits or turpentine, resin, tar, and pitch.

— **Redwood** — planing-mill products, tanks, silos, flumes, water towers, bridge timbers, trestles, exterior siding and trim, exterior ornamentation, fences, plywood, and paneling

— **Sitka, Engelman, white, red, and black spruce** — general construction, planing-mill products, plywood, cabinets, ladder rails, decking, and posts

- **Hardwoods**

— **Alder or red alder (fruitwood)** — cabinets; low-cost substitute for cherry

— **Northern brown ash and southern white ash** — fixtures, cabinets, plywood, plywood edging, and cabinet-door moldings

— **Basswood** — planing-mill products and moldings

— **Beech** — planing-mill products and flooring

NOTE: Beech is a sturdy, general-purpose hardwood and is an excellent alternate for birch or hard maple.

— **Northern birch** — planing-mill products, interior finish, trim, cabinets, plywood, veneers, dowel pins, dowel rods, screwhole buttons, and plugs

— **Butternut** — interior finish and paneling

— **Cherry** — furniture and cabinet work, plywood, paneling, veneers, screwhole buttons and plugs

- **Cottonwood** — stair risers and general cabinet work

- **American elm** — plywood and burl veneers

- **Sap gum and selected red gum** — millwork, cabinets, plywood, veneers, plywood core stock, and crating-grade plywood

- **Mahogany** — cabinets, paneling, veneers, plywood, plywood edging, screwhole buttons and plugs, flooring, trim, and exterior siding

  NOTE: There are various types of mahogany from different areas and their appearances differ considerably.

- **Hard maple** — millwork and flooring

- **Red oak** — interior finish, flooring, veneers, heavy construction, timbers, plywood, plywood edging, cabinets, screwhole buttons and plugs, and dowel rods

- **White oak** — interior finish, flooring, plywood, veneers, heavy construction, and timbers

- **Pecan** — plywood, paneling, and veneers

- **Persimmon** — used for plane stock and decorative veneers

- **Yellow poplar** — millwork, plywood core stock, trim, and siding

- **American sycamore** — interior finish and cabinet work

- **American or black walnut** — interior finish, paneling, veneers, plywood, plywood edging, machines, flooring, trim and moldings, screwhole buttons and plugs, and dowel rods

OBJECTIVE 4

Differentiate between the various grades of wood.

- **Softwood Lumber Grades**

  Softwood lumber is used in shops and factories for shaped wood such as trim and molding and for on-site construction. Softwood lumber used in on-site construction is classed according to its size. *Boards* are 1 to 1½ inches thick and 2 inches or more wide.

Dimension lumber is 2 to 5 inches thick and 2 inches or more wide. Timbers are 5 inches or more thick and 5 inches or more wide. Grades in this section are shown in descending order of quality, beginning with the best and moving to the least.

- **Boards**

  a. Select
     1. B and better
     2. C select
     3. D select

  b. Common
     1. No. 1 common
     2. No. 2 common
     3. No. 3 common
     4. No. 4 common

- **Dimension**

  a. Light-framing
     1. Construction
     2. Standard
     3. Utility
     4. Economy

  b. Structural
     1. Select structural
     2. No. 1
     3. No. 2
     4. No. 3
     5. Economy

- **Timbers**

  a. Select structural

  b. No. 1

  c. No. 2 (No. 1 Mining)

- **Hardwood Lumber Grades**

  — First and second (FAS)

  The best grade yields about 85 to 90 percent clear cutting. Most boards are a minimum of 6 inches wide and 18 inches long. FAS lumber is graded from the poorest side.

  — First and second one face and better (FAS 1 side and better)

  These boards are subject to the same grading rules as FAS boards, except the board is graded from the best side.

  — Selects and better

  These boards are subject to the same grading rules as FAS 1 side and better, except the minimum allowable width is 4 inches.

  — Selects

  These boards are a minimum of 4 inches wide and 6 feet long. Better side grades FAS; reverse side grades No. 1 Common. Short and narrow boards are usually clear.

  — No. 1 common (thrift)

  These boards are a minimum of 3 inches wide and 4 feet long. This grade yields over two-thirds clear cuttings and contains less sap than clear grades. Stock is generally long with average widths.

OBJECTIVE 5

Given a description, differentiate plywood types and grades.

- **Softwood Plywood Grades**

  Softwood plywoods are graded by their face veneers, using a system of letters to show the quality of the veneers. Each face is graded, and the plywood is then designated by the letter grades of the two face veneers, such as A-B, A-D, or C-D.

  — **N** — intended for smooth surface, natural finish; select heartwood or all sapwood free from all open defects; may contain a few repairs if well-matched

  — **A** — smooth, paintable, well-jointed; permits more than eighteen neatly-made boat, sled, or router-type repairs parallel to grain

  — **B** — relatively smooth; permits circular repair plugs and small tight knots to 1 inch; wood or synthetic patching material may be used; some minor splits are permitted

  — **C** — tight knots to 1½ inches; permits knotholes to 1 inch and some to 1½ inches if total width is within specified limits; synthetic or wood repairs are permitted; limited splits allowed

  — **C (plugged)** — improved C veneer with splits limited to ⅛ inch wide and knotholes and borer holes limited to ¼" × ½"; synthetic repairs permitted

  — **D** — permits knots and knotholes to 2½ inches in width and ½ inch larger under certain specified limits; limited splits are permitted

Softwood plywoods are classed as interior [INT] or exterior [EXT]. Interior plywoods are made with a moisture-resistant glue, while exterior plywoods are made with a waterproof glue.

TABLE 3

Standard softwood plywood grades (by face veneer)

Interior	Exterior
A-A	A-A
A-B	A-B
A-D	A-C
B-B	B-B
B-D	B-C
C-D	C-D
APA Plyform	B-B Plyform
	HDO Plyform

- **Hardwood Plywood Grades**

  The outer plies of plywood are called the *face* and *back*, the next plies or layers are called *crossbands*, and the inside plies or the centers are called *cores*.

  — **A** — premium

  — **A1** — premium one side, sound back; back has light, uniform color and grain; can be mismatched

  — **A2** — premium one side, sound back; back is free of open defects; can be mismatched and of a different species

  — **G1S** — good one side, reject back; back has knotholes

  — **G2S** — good both sides

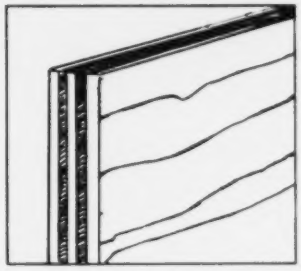
  — **craft shop** — sound utility face and back, reasonably well matched in color

  — **shop utility** — sound face; American-made unless specified otherwise; all grades with softwood core may have small cracks in core where individual pieces of veneer edge do not meet perfectly

- **Types of plywood core construction**

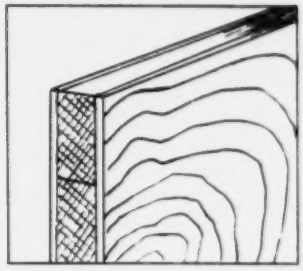
  — Veneer core

FIGURE 9



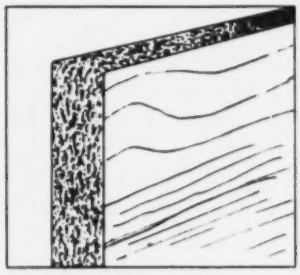
  — Lumber core

FIGURE 10



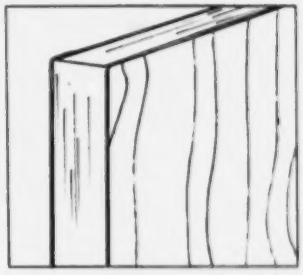
  — Particle-board core

FIGURE 11



  — Fiberboard core

FIGURE 12



OBJECTIVE 6

Given a brief description, match types of wood paneling.

- **Reconstituted Wood Panels**

  Reconstituted wood panels are non-veneered and made up from wood particles, flakes or strands bonded together and formed into sheets.

— **composite board** — used for underlayment, roof and wall sheathing

— **hardboard** — used for cabinets, door skins, paneling, underlayment and exterior siding

— **non structural particleboard** — used for countertops, shelving, cabinets, sliding doors, interior paneling, floor underlayment and inner core of plywood panels

— **oriented strand board** — used for subfloors and roof sheathing

— **structural particleboard (flakeboard or chipboard)** — used for subfloors, roof decks and wall sheathing

— **waferboard** — used for subfloors, roof and wall sheathing, shelving, cabinets and roof soffits

OBJECTIVE 7

Provided a drawing, select the various types of trim and molding.

- **Types of woods used for trim and molding**

  — Ash

  — Basswood

  — Birch

  — Cypress

  — Mahogany

  — Oak

  — Pecan

  — Redwood

  — Walnut

  — White pine

- **Types of trim and moldings**

Trim is the finish material in a building, such as that applied around window and door openings or at the floor and ceiling of rooms.

— Base

FIGURE 13

— Casing

FIGURE 14

— Cove molding

FIGURE 15

FIGURE 16

— Quarter Round

FIGURE 17

FIGURE 18

— Inside corner

FIGURE 19

— Outside corner

FIGURE 20

— Cap molding; detail caps

FIGURE 21

FIGURE 22

— Chair rail

FIGURE 23

— Wainscot cap (Batten)

FIGURE 24

— Astragal

FIGURE 25

— Base shoe

FIGURE 26

OBJECTIVE 8

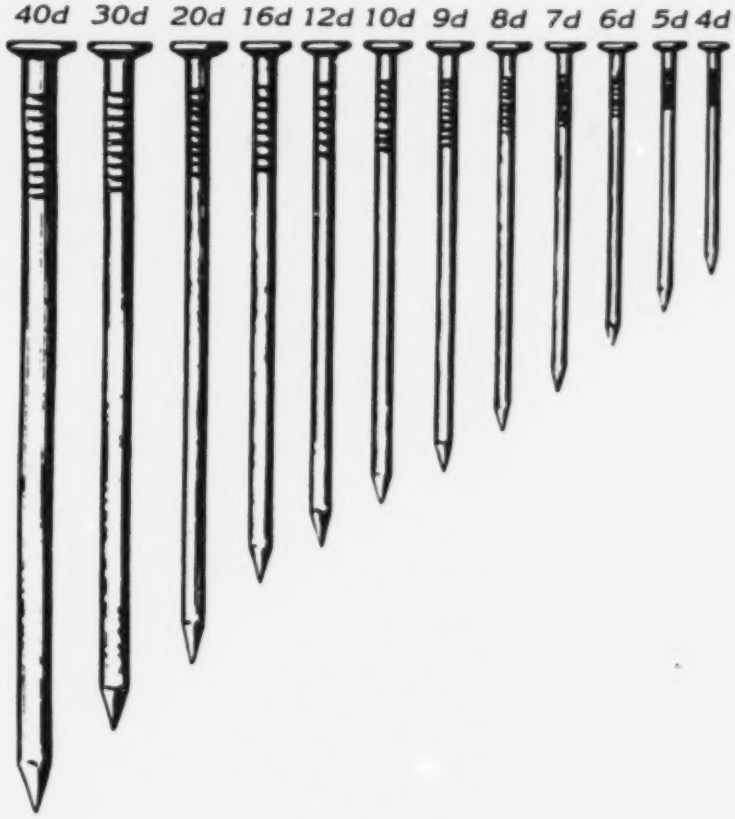
Given pictures, identify common fasteners and their primary application.

Fasteners used in wood construction include of nails, screws, hangers, and metal nail plates. These are the most common types of fastening devices and have a wide range of applications. The fasteners are *not* shown in actual size.

- **Nails**

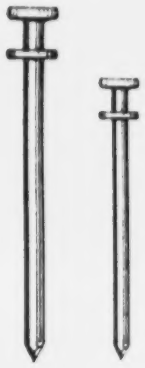
  — Common nails are used in general carpentry work such as framing.

FIGURE 27



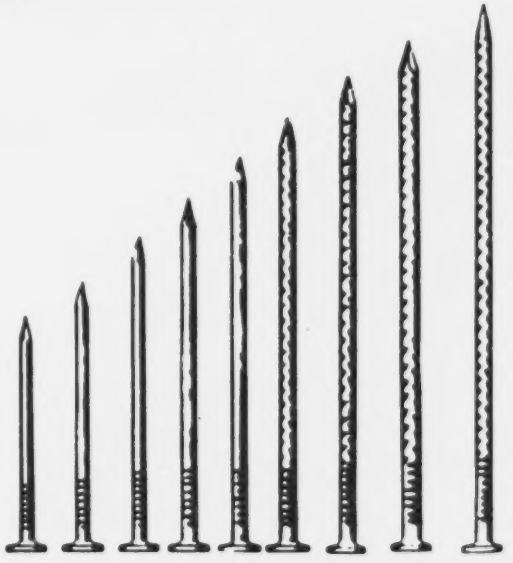
— Duplex nails are doubled-head nails designed for easy removal. They are used in concrete formwork and other temporary construction.

FIGURE 28



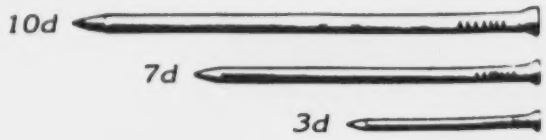
— Box nails have slimmer shanks than common nails. They are used in applications where the wood easily splits.

FIGURE 29



— Casing nails are slim nails with small flared heads. They are used in finish work such as trim and door installation.

FIGURE 30



— Finishing nails have smooth shanks and a small head. These nails are used in attaching paneling and trim. Often the head of the finish nail is set or indented to allow it to be covered or filled.

FIGURE 31

- **Screws**

  Screws have gained popularity in carpentry due to their strength and holding power. Screws come in many sizes, styles, and have a wide range of uses. Uses include attaching drywall, installing wood trim, and securing plywood decking.

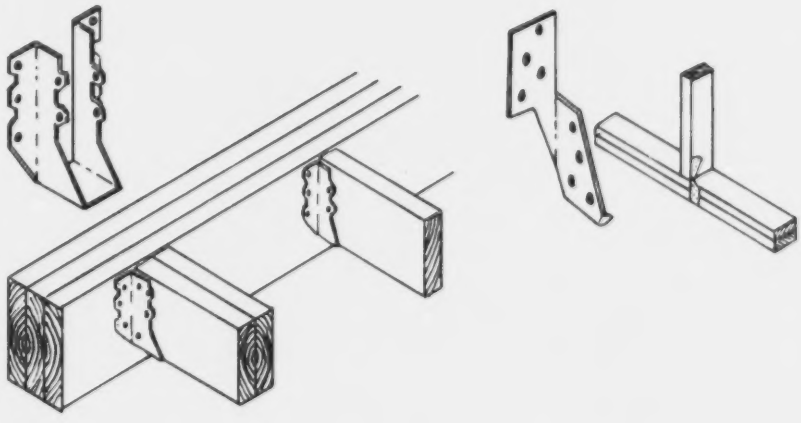
FIGURE 32

- **Hangers**

  Hangers are made of metal and support suspended members such as joists and rafters. They greatly increase the structural strength of buildings. In areas where high winds are prevalent, hangers may be required by building codes.

  There are many types of hangers available; the figure below shows but a few.

FIGURE 33

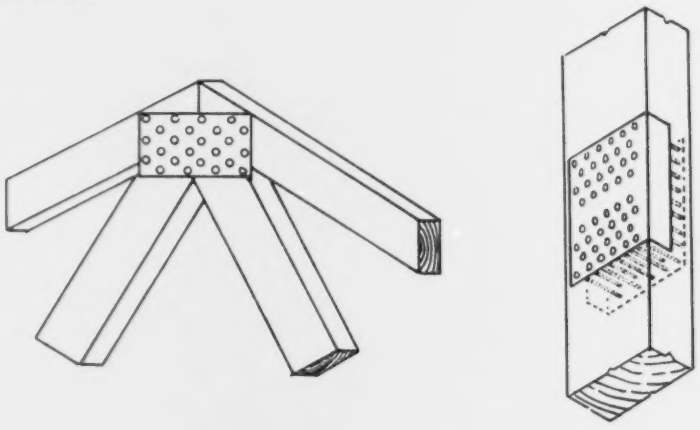


- **Nail plates**

  Nail plates are popular in framing because they increase the strength while reducing the labor cost over use of single nails.

  Nail plates come in several styles and sizes. The examples shown below are nail plates used for a truss and a butt splice.

FIGURE 34



OBJECTIVE 9 **Compute lumber quantities.**

- **Units of Measure**

  Lumber and certain related building materials come in basically three different units of measurement, each unit serving as the basis for pricing such materials. For example, 2×4 studs are priced by the board foot, plywood by square foot, and molding by lineal foot. Also, lumber suppliers often give discounts for large-quantity orders. For instance, they may have one price per board foot and a lower price for 100 board feet [c bd. ft.] or per 1000 board feet [M bd. ft.].

  — **board foot** — boards, dimension lumber, structural lumber, shop and factory lumber

— **square foot** — plywood, particle board, drywall, sheathing, paneling, certain hardwoods, milled boards, and specialty products such as flooring and ceiling tile

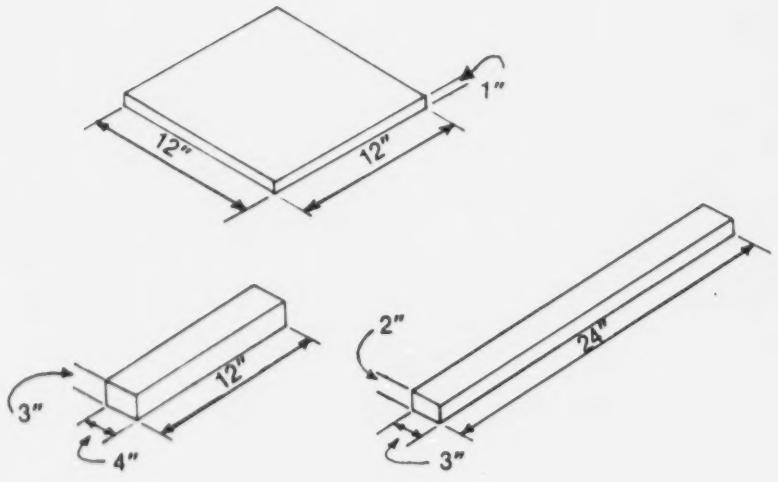
— **lineal foot** — molding and trim

- **Computing lumber quantities.**

— Board feet

A board foot is 1 inch thick, 12 " wide, and 12" long, or the equivalent. Each of the illustrations in Figure 35 is 1 board foot.

FIGURE 35



1. Use formula $\frac{T \times W \times L \times N}{12} =$

where N is number of pieces, T is thickness in inches, W is width in inches, and L is length in feet

2. Use nominal sizes in figuring board feet, except for lumber less than 1 inch thick, which is figured as 1 inch

   EXAMPLE: A piece ½" × 12" ×12" is considered to be 1 board foot.

3. Round fractional board feet to next full board foot

   EXAMPLES: 1⅓ board feet is rounded to 2 board feet.
   1½ board feet is rounded to 2 board feet.
   1¾ board feet is rounded to 2 board feet.
   ½ board foot is rounded to 1 board foot.

- **Square feet**

NOTE: A square foot is an area equal to a square with 12-inch sides.

1. Use the formula A = W × L, where A is area, W is width, and L is length

   EXAMPLE: To figure the square footage in a 4′ × 8′ sheet of plywood
   A = W × L
   = 4′ × 8′
   = 32 square feet

2. To find number of units needed (sheets, tiles, pieces, etc.), divide number of square feet to be covered by total square feet in one unit in which material is sold

3. Round fractional units to next whole unit in which material is sold

   EXAMPLE: To figure the plywood decking for a roof 20′-0" × 41′-", use the formula A = W × L— you get 280 total square feet to be covered. Divide this number by 32 (total square feet in one sheet of plywood) which result in 25⅝. Round this fractional unit to 26. Order twenty-six sheets of plywood to cover the area with no allowance for waste.

- **Lineal feet** — Measure the distance in which the required product will be used

  NOTE: Molding and trim are sold in standard lengths of even-foot measurements. Most suppliers mix the lengths to get as close as possible to the amount ordered. For example, a supplier would probably ship 108 or 110 feet of base if an order called for 107 feet. The buyer is charged for the amount delivered, not for the amount ordered.

OBJECTIVE 10

Write a lumber requisition

- Amount — Specify either as number of pieces or as quantity

  EXAMPLES: 200 board feet of 1″ × 12″ white pine; 36 sheets of ½″ C-D plywood; 150 feet of sanitary base, 6 each 2″ × 4″ × 14′ of fir

- Size

  1. For boards, dimension, and structural lumber, specify thickness, width, and length
  2. For plywoods, paneling, and some other sheet products such as lumber core ash, specify thickness
  3. For most trim and molding, specify thickness and width
  4. When actual size of product is different from nominal size, use nominal size when ordering

- Grade — Specify according to industry grading standards
- Type of wood — Specify if a particular species is required
- Drying — Specify if moisture content is a concern

  NOTE: Most lumber is kiln-dried [KD], and most orders will not specify drying unless something other than KD is desired or if the desired moisture content is different from what is normally stocked for that type of lumber.

- Cut and surfacing — Specify if edge-grained or quarter-sawed cut is desired or if surface finishes other than what is normal for type of lumber are desired

- Special requirements — Specify if special characteristics of the lumber are required, or if the supplier is to prepare the lumber in a special way (Table 4)

TABLE 4

Special requirements

Amount	Size	Description
6	2″ × 4″ × 14′	Utility, fir, KD
36 sheets	½″	C-D, fir
150′	½″ × 3⅛″	#1 sanitary base, ash
200 Bd ft	1″ × 12″	Construction, white pine, hand select

LUMBER GRADING

APPEARANCE GRADES		BOARDS
Selects	B and better C select D select	Selects are used for walls, ceilings, trim, and other areas where appearance is important.
Finish	Superior Prime E	
Paneling	Clear (any select or finish grade) No. 2 common (selected for knotty paneling) No. 3 common (selected for knotty paneling)	
Siding (bevel, bungalow)	Superior Prime	
Boards, sheathing	No. 1 common No. 2 common No. 3 common No. 4 common	Common boards are used for shelving, decking, window trim, and other applications where appearance is less critical, or where on-site selection and cutting is practical when appearance is a consideration.
Alternate board grades	Select merchantable Construction Standard Utility	

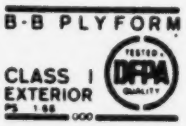
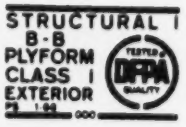
DIMENSION

Light framing 2″ to 4″ thick 2″ to 4″ wide	Construction Standard Utility Economy	Light-framing lumber is used where great strength is *not* required, such as for studs, plates and sills.
Studs 2″ to 4″ thick	Stud Economy stud	This optional all-purpose grade is limited to 10 feet in length and is suitable for all stud uses, including load-bearing walls.
Structural light framing 2″ to 4″ thick 2″ to 4″ wide	Select structural No. 1 No. 2 No. 3 Economy	Structural lumber is used for light-framing and forming where greater bending-strength is required. Typical uses include trusses, concrete pier wall forms, etc.
Structural joist and planks 2″ to 4″ thick 6″ and wider	Select structural No. 1 No. 2 No. 3 Economy	These grades are designed especially for lumber 6 inches and wider, and are suitable for use as joists and rafters and for general framing.

TIMBERS

Timbers	Select structural No. 1 No. 2 (No. 1 mining) No. 3 (No. 2 mining)	Timbers are used for stringers, beams, posts, and other support members.

PLYWOOD GRADES AND GRADE TRADEMARKS

Grade	Description	Grade Trademark
B-B Plyform, Class I and II** DFPA	Specifically manufactured for concrete forms; many reuses; smooth, solid surfaces, edge-sealed, and milloiled unless otherwise specified	
High-density overlaid Plyform, Class I and II** DFPA	Hard, semiopaque resin-fiber overlay, heat-fused to panel faces. Smooth surface resists abrasion. Up to two hundred reuses. Edge-sealed. Light oiling recommended between pours.	
Structural I Plyform** DFPA	Especially designed for engineered applications; all Group 1 species; stronger and stiffer than Plyform, Classes I and II. Recommended for high pressures where face grain is parallel to supports. Also available with high-density overly faces.	
Special overlays, proprietary panels and medium-density overlaid plywood specifically designed for concrete forming**	Produce a smooth, uniform concrete surface. Generally mill-treated with form-release agent. Check with manufacturer for design treatment recommendations for greatest number of reuses.	

*Commonly available in ⅝-inch and ¾-inch panel thicknesses (4′ × 8″ size)
**Check with dealer for availability in your area.

GUIDE TO APA PERFORMANCE-RATED PLYWOOD PANELS

GRADE DESIGNATION	DESCRIPTION AND COMMON USES	TYPICAL TRADEMARKS
APA RATED SHEATHING EXP 1 or 2	Specially designed for subflooring and wall and roof sheathing, but can also be used for a broad range of other construction and industrial applications. Can be manufactured as conventional veneered plywood, as a composite, or as a nonveneered panel. For special engineered applications, including high load requirements and certain industrial uses, veneered panels conforming to PS 1 may be required. Specify Exposure 1 when long construction delays are anticipated. Common thicknesses: 5/16, 3/8, 7/16, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.	APA RATED SHEATHING 32/16 15/32 INCH SIZED FOR SPACING EXPOSURE 1 000 NER-108
APA STRUCTURAL 1 RATED SHEATHING EXP 1	Unsanded all-veneer plywood grades for use where strength properties are of maximum importance; structural diaphragms, box beams, gusset plates, stressed-skin panels, containers, pallet bins. Made only with exterior glue (Exposure 1). Common thicknesses: 5/16, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4.	APA RATED SHEATHING STRUCTURAL 1 48/24 23/32 INCH SIZED FOR SPACING EXTERIOR 000 PS 1-83 CC NER-108
APA RATED STURD-I-FLOOR EXP 1 OR 2	For combination subfloor-underlayment. Provides smooth surface for application of carpet and possesses high concentrated and impact load resistance. Can be manufactured as conventional veneered plywood, as a composite, or as a nonveneered panel. Available square edge or tongue-and-groove. Specify Exposure 1 when long construction delays are anticipated. Common thicknesses: 19/32, 5/8, 23/32, 3/4.	APA RATED STURD-I-FLOOR 20 oc 19/32INCH SIZED FOR SPACING EXPOSURE 1 000 NER-108
APA RATED STURD-I-FLOOR 48 OC (2-4-1) EXP 1	For combination subfloor-underlayment on 32- and 48-inch spans and for heavy timber roof construction. Provides smooth surface for application of resilient floor coverings and possesses high concentrated and impact load resistance. Manufactured only as conventional veneered plywood and only with exterior glue (Exposure 1). Available square edge or tongue-and-groove. Thickness: 1 1/8.	APA RATED STURD-I-FLOOR 48 oc 1-1/8 inch 2-4-1 SIZED FOR SPACING EXPOSURE 1 TAG 000 UNDERLAYMENT PS1-83 NER-108

American Plywood Association

PARTICLEBOARD

	Applications	Grade	Product References
Subfloor and Combined Subfloor and Underlayment	Floor underlayment	1-M-1	ICBO, SBCC, BOCA, HUD/FHA MPS One and Two Family Dwelling Code
	Mobile home decking	Class D-2 Class D-3	NPA 1-73, HUD-Mobile Home Construction and Safety Standards
Thickness (in.) Max. Span (in.) ⅜ 16 21/32 16 ¾ 19.2	Combined subfloor underlayment	2-M-3 2-M-W	ICBO, SBCC, BOCA, One and Two Family Dwelling Code
	Factory-built decking	NPA 2-72	HUD/FHA, UM-57a

ORIENTED STRANDBOARD

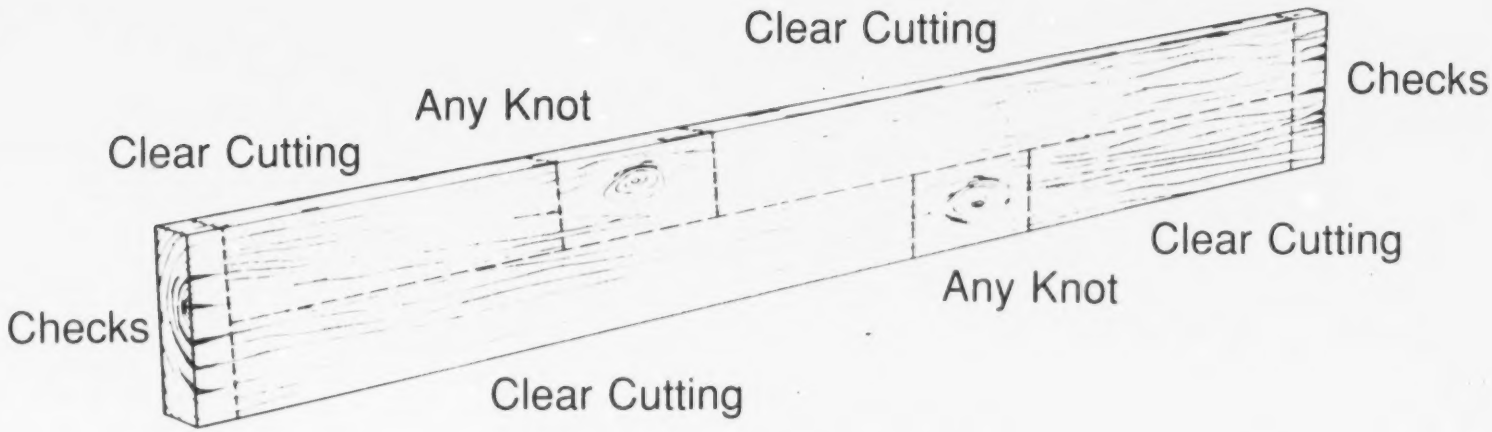
The EXPOSURE 1 rating on a panel means that the panel is intended for protected construction applications where ability to resist moisture during long construction delays or where exposure to conditions of similar severity is required. Exposure 1 panels are comparable to panels designated under PS 1 as interior type with exterior glue, such as C-D interior with exterior glue (CDX).

Internal Bond	75 psi
Density	43.5 lbs. cu. foot
Hardness	1000 lbs.
Linear Expansion (maximum Average 50%-90% R.H.)	0.20%
Minimum Direct Nail Withdrawal	20 lbs.
Testing Agency	APA
Code Approval	NRB #108
FHA/HUD	MR #1069*
(*Update submitted for acceptance)	

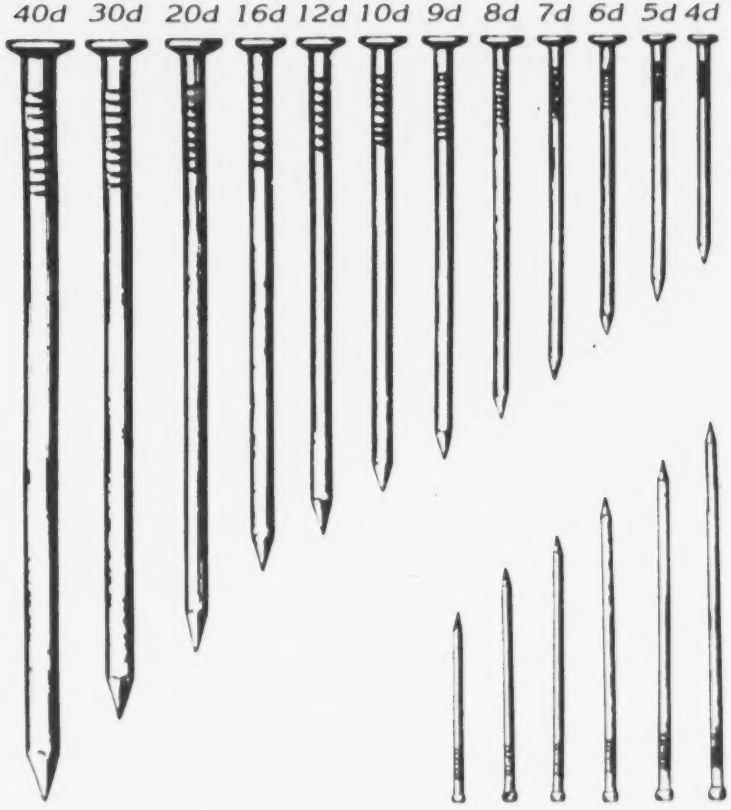
Span Index	Weight/MSF
7/16* 24/16	1608

Information compiled from National Particleboard Association and Georgia Pacific

Clear Cutting

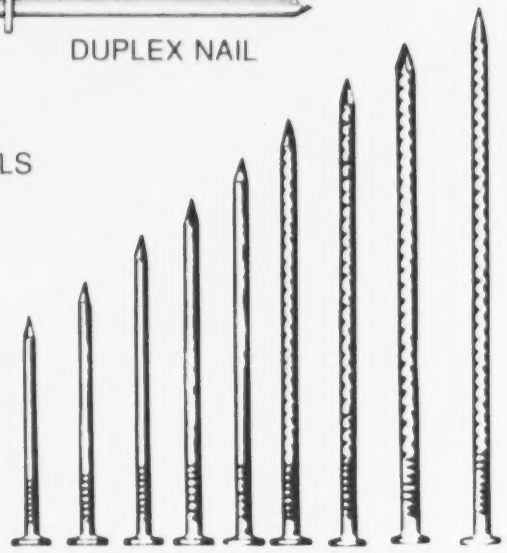


Nails

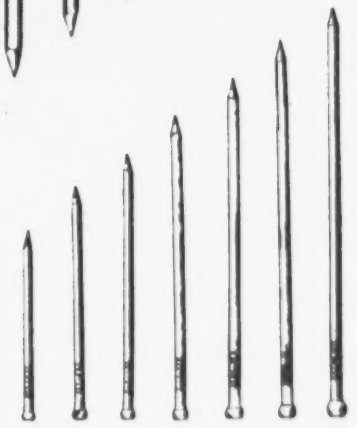


COMMON NAILS

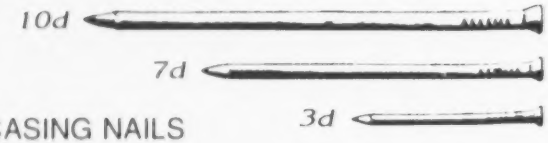
DUPLEX NAIL



BOX NAILS: SMOOTH, BARBED



FINISHING NAILS



CASING NAILS

TRANSPARENCY MASTER 2 - Introduction to Carpentry
CIMC - A 1 - 45

Wtech

TM 2

Lengths of Nails by Pennyweight

Pennyweight	Length in inches for common, box, and finish nails
2d	1
3d	1¼
4d	1½
5d	1¾
6d*	2
7d	2¼
8d*	2½
9d	2¾
10d	3
12d	3¼
16d*	3½
20d*	4

*Sizes most often used in construction

ASSIGNMENT SHEET 1	CARPENTRY MATERIALS	A 1

NAME _____ SCORE _____

OBJECTIVE 9

Compute lumber quantities.

INTRODUCTION

In order to write accurate lumber requisitions, a carpenter must be skilled in computing lumber quantities. Practice computing total board feet, square feet, and lineal feet by completing this assignment sheet.

Part 1

DIRECTIONS

Reading Comprehension Skills
- Apply word analysis techniques

Functional Reading Skills
- Follow written instructions

Compute total board feet for each of the following problems. Round fractional board feet to the next full board foot. Write your answers in the space provided.

1. One common board 1″ × 10″ × 10′ = _____
2. One select board 1″ × 4″× 14′ = _____
3. One piece of light-framing dimension lumber 2″ × 6″ × 8′ = _____
4. One piece of structural dimension lumber 2″ × 8″ × 10′ = _____
5. Two select boards 2″ × 6″ × 8′ = _____
6. Five common boards 1″ × 8″ × 8′ = _____
7. Ten pieces of structural dimension lumber 4″ × 6″ × 10′ = _____
8. One piece of light-framing dimension lumber 2″ × 4″ × 18′ = _____

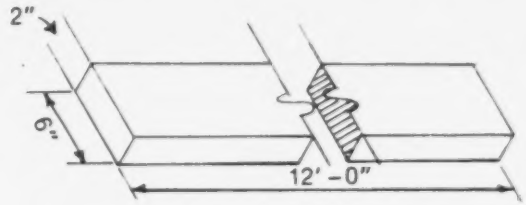
Operation and Calculation Skills
- Calculate with whole numbers

Math Application Skills
- Solve word problems

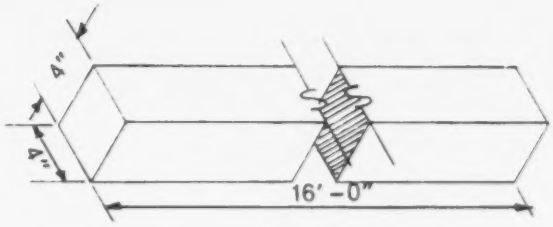
9. One hundred timbers 5″ × 12″ × 24′ = _____

10. Thirty common boards at 1″ × 2″ × 6′ = _____

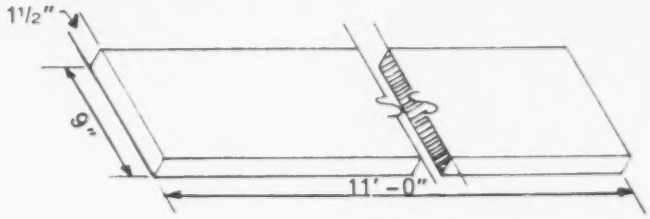
11. Compute board feet for each of the pieces of lumber in the following illustrations.



a. _____ board feet



b. _____ board feet



c. _____ board feet

Part 2

Compute square feet and determine the number of sheets needed to cover each of the following surface areas with the material listed below them. Plywood comes in 32-square-foot sheets. Remember to round fractional sheets to the next whole sheet.

1. Area 11′-6″ × 9′-10″ = _____ square feet
   (Plywood) _____ sheets
2. Area 24′-0″ × 13′-0″ = _____ square feet
   (Plywood) _____ sheets
3. Area 46′-0″ × 38′-0″ = _____ square feet
   (Plywood) _____ sheets
4. Area 15′-0″ × 18′-0″ = _____ square feet
   (Plywood) _____ sheets
5. Area 32′-0″ × 12′-0″ = _____ square feet
   (Paneling) _____ sheets

Part 3

DIRECTIONS Figure lineal feet for each of the following problems.

1. Eight pieces of base 12-feet long = _____ lineal feet
2. Forty-two pieces of molding 16-feet long = _____ lineal feet
3. Figure the base needed for shop or classroom 38-feet long and half as wide.

   Lineal feet of base = _____

ASSIGNMENT SHEET 2

CARPENTRY MATERIALS — A 1

NAME _____ SCORE _____

OBJECTIVE 10

Write a lumber requisition.

INTRODUCTION

A carpenter must be aware that lumber is appropriate for its intended use. It must be the correct kind of wood, the most economical grade to suit the purpose, the right size, and it must be properly cut and dried. All of these characteristics, as well as the quantity required, must be specified when ordering lumber.

DIRECTIONS

Reading Comprehension Skills
- Apply word analysis techniques

Functional Reading Skills
- Interpret forms and records
- Follow written instructions

Composition Skills
- Compose reports

Operation and Calculation Skills
- Calculate with whole numbers

Math Application Skills
- Solve word problems

Use the form on the next page to write a requisition for the materials required for each situation described below. Refer to the information sheet or other texts for additional information, or consult with a local materials supplier. Answers and materials selected will vary. Be prepared to discuss your choices and your reasons for these choices.

1. Order the plywood required to deck a 2000-square foot roof.
2. Order the material needed to build the decking for a rot-resistant deck, 10′-0″ × 14′-0″.
3. Order cove molding for two rooms 18′ × 12′ and for one room 22′ × 16′.
4. Order birch material for cabinet doors. You need enough for fifteen 12″ × 24″ doors.
5. Order a rot-resistant rough-surface material for use on the gable of a house. You need enough to cover 144 square feet.
6. Order studs for energy-efficient walls. You will need 146 studs 92⅝ inches long.
7. Order material for 12-inch deep wood shelves to be used in 6-foot wide closets. You need enough for eight closets. There is one shelf per closet.

8. Order material for ceiling joists. The material needs to span a house 28′-0″ wide with a load-bearing wall at 14′-0″. You need enough material to have a joist every 16 inches for a run of 46′-0″. Allow the joists to overlap 24 inches at the load-bearing wall.

9. Order material to line wardrobe closet to protect the clothing from mildew and moths. The material should have a pleasing appearance. You will need enough to cover 320 square feet.

10. Order material to lay the sole plate of a building built with 2 × 4 walls. The material should be treated. You will need enough to go around a 24′-0″ × 48′-0″ building.

	Amount	Size	Description
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

ASSIGNMENT SHEET 1

Part 1

1.	9	6.	27	11. a.	12
2.	5	7.	200	b.	22
3.	8	8.	12	c.	13

4. 14 9. 12,000

5. 16 10. 30

Part 2

1. 113; 4
2. 312; 10
3. 1,748; 55
4. 270; 9
5. 384; 12

Part 3

1. 96
2. 672
3. 114

ASSIGNMENT SHEET 2

NOTE: The answers given are typical orders for each situation and make no allowance for waste. However, your students may have different answers that are acceptable if they choose different materials or laid out the materials differently. Material selections may reflect various construction techniques or the availability of materials in your area. By discussing their choices and the reasons for those choices, your students will develop a greater understanding of lumber grades, dimensions, and applications.

Amount	Size	Description
1. 63 sheets	4′ × 8′ × ½″	C-D plywood
2. 42	2″ × 4″ × 10′	Construction grade redwood, selected for minimum crown
3. 196 lineal feet	¾″ × ⅞″	Ash cove molding
4. 1 sheet	4′ × 8′ × ¾″	Birch, fibercore plywood
5. 144 board feet	1″ × 12″	#2 rough cedar
6. 146	2″ × 6″ × 92⅝″	Utility studs
7. 4	1″ × 12″ × 12′	#2 white pine
8. 72	2″ × 6″ × 16′	Utility, Douglas fir
9. 640 lineal feet	1″ × 6″	Tongue-and-groove-cedar, select
10. 9	2″ × 4″ × 16′	Utility, Douglas fir, treated

WRITTEN TEST	CARPENTRY MATERIALS	A 1

NAME _____ SCORE _____

OBJECTIVE 1

Given a list of terms associated with wood products, match them to their correct definitions. Write the letter that corresponds to the most correct answer.

_____ 1. Lumber that has been dried in a heated enclosure is called:

a. heat-cured
b. kiln-dried
c. sapwood
d. baked-wood

_____ 2. Which of the following terms best describe a thin layer or sheet of wood glued to another base material?

a. Veneer
b. Glued panel
c. Surface wood
d. Softwood

_____ 3. The process of removing waste from boards is called:

a. clear cutting
b. molding
c. pressure treatment
d. sanding

_____ 4. What is the term to describe the standards established by the National Hardwood Lumber Association to classify lumber by quality?

a. Lumber types
b. Standards of quality
c. Wood classifications
d. Lumber grades

May be photocopied for student use.

_____ 5. Which of the following terms describe the process of forcing preservatives into wood fibers?

a. Oxidation process
b. Pressure treated
c. Core treated
d. Kiln-dried

_____ 6. The physical measurement of lumber after drying and shaping is called its _____size.

a. actual
b. nominal
c. dried
d. cured

_____ 7. What is the term used to describe a fabricated wood product of three or more layers of veneer joined with glue?

a. Core
b. Wood
c. Plywood
d. Layered wood

_____ 8. Wood that is produced from any needle or cone-bearing tree is called:

a. hardwood
b. softwood
c. sapwood
d. heartwood

_____ 9. What is the term to describe a narrow strip of wood used for ornamentation and to conceal surface joints?

a. Strip cover
b. Veneer
c. Concealment strip
d. Molding

May be photocopied for student use

_____10. The central part of the tree trunk, consisting of mature wood that will have very little color change is the

a. softwood
b. hardwood
c. sapwood
d. heartwood

_____11. A vertical wood or metal framing members in a wall; usually a 2×4 or 2×6, is called a

a. stud
b. joist
c. rafter
d. truss

_____12. A horizontal member that supports loads over an opening is a

a. plate
b. joist
c. beam
d. stringer

_____13. The lowest horizontal framing member in a wall opening or lowest member attached to the foundation and supporting other members is a

a. stud
b. sill
c. plate
d. footer

_____14. The horizontal framing member at the top or bottom to which studs are attached is the

a. beam
b. pier
c. joist
d. plate

May be photocopied for student use.

_____15. The beam that rests on other supports, such as a joist or beam is a

a. stringer
b. truss
c. sill
d. joist

OBJECTIVE 2

Given a list of alternatives, identify wood characteristics by their definitions or by their representative drawings.

_____ 1. Which wood characteristic(s) are used to grade lumber?

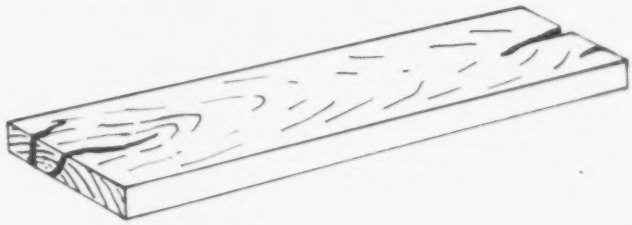
a. Strength
b. Appearance
c. Number of defects
d. All of the above

_____ 2. The drawing below represents lumber with a:

a. crook
b. bow
c. cup
d. twist

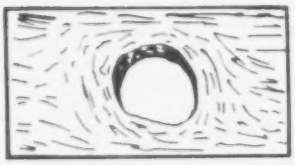
May be photocopied for student use

_____ 3. The lumber shown below has which of the following characteristics?



a. Checks
b. Cracks
c. Runs
d. All of the above

_____ 4. The figure below represents lumber with a



a. check
b. spike
c. knothole
d. twist

_____ 5. The length of lumber is generally stated as a/an:

a. actual
b. nominal
c. rough
d. pre-drier

May be photocopied for student use.

_____ 6. The width and length of lumber is stated as a/an _____ measurement.

a. actual
b. nominal
c. processed
d. dried

_____ 7. Flat-grained in softwood is the same as _____ in hardwoods.

a. quarter grained
b. edge-grained
c. quarter sawed
d. plain sawed

_____ 8. S1S means

a. one surface has been planed
b. two surfaces have been planed
c. #1 grade lumber
d. #1 grade lumber with smooth sides

_____ 9. Lumber is dried to reduce its weight, improve usability, and

a. increase hardness
b. improve weather resistance
c. decrease shrinkage
d. deter insects and fungi

_____10. Green lumber has a moisture content of over

a. 10%
b. 20%
c. 30%
d. 40%

May be photocopied for student use

OBJECTIVE 3

Given alternatives, match the type of wood to its correct use.

_____ 1. Which of the following types of softwoods would be used for building fences or as exterior siding?

a. Butternut
b. Redwood
c. Western hemlock
d. Larch

_____ 2. What type of softwood would most common be used to obtain turpentine, resin, tar, and pitch?

a. Butternut
b. Redwood
c. Western hemlock
d. Ponderosa, white or yellow pine

_____ 3. Cherry is a hardwood commonly used in:

a. stair risers and trim
b. dowel pins
c. exterior siding
d. furniture and cabinet work

_____ 4. The BEST wood for lining a closet would be

a. larch
b. white fir
c. basswood
d. incense cedar

_____ 5. Cotton is used for

a. plywood and veneers
b. stair risers and cabinets
c. exterior ornamentation
d. decking

May be photocopied for student use

_____ 6. For flooring material, the carpenter would select

a. hard maple
b. western red cedar
c. red gum
d. American sycamore

_____ 7. Which of the following is NOT an appropriate wood for screwhole buttons and plugs?

a. Black walnut
b. Mahogany
c. Yellow poplar
d. red oak

_____ 8. Persimmon is used for

a. millwork and flooring
b. plane stock and decorative veneers
c. interior finish and cabinet work
d. plywood, paneling, and veneers

_____ 9. Softwoods include all of the following EXCEPT

a. beech
b. redwood
c. spruce
d. cypress

_____ 10. Hardwoods include all of the following EXCEPT

a. sycamore
b. birch
c. hemlock
d. ash

_____ 11. Which of the following is used for molding?

a. yellow poplar
b. American elm
c. red spruce
d. basswood

May be photocopied for student use

_____12. For cabinet work, common wood types include sap gum, white pine, or

a. bald cypress
b. Western red cedar
c. red alder
d. American elm

_____13. Comparing red oak and white oak

a. red oak has more uses
b. white oak can be used for timbers, but not red oak
c. red oak can be used for timbers, but not white oak
d. white oak is more decorative

OBJECTIVE 4 **Differentiate between the various grades of wood.**

_____ 1. A 2 x 4 piece of lumber would be graded as a/an:

a. timber
b. board
c. dimension
d. all of the above

_____ 2. A "No. 3 common" board is graded as better than a:

a. No. 1
b. No. 2
c. No. 4
d. all the above

_____ 3. A hardwood board that is graded from the best side would be classed as a/an _____ grade.

a. FAS 1
b. FAS
c. select
d. No. 1 common

May be photocopied for student use.

_____ 4. Select and better lumber has a minimum width and length of

a. 3 inches wide. 4 feet long
b. 3 inches wide 6 feet long
c. 4 inches wide. 18 inches long
d. 4 inches wide. 6 feet long

_____ 5. No. 1 common hardwood lumber

a. is classified either dimension or timber lumber
b. is graded from the poorest side
c. is generally short
d. contains less sap than clear grades

OBJECTIVE 5 **Given a description, differentiate plywood types and grades.**

_____ 1. Softwood plywood with a grade of A-C would have:

a. both sides with smooth, natural finished surfaces
b. one smooth side and one side with tight knots to 1 ½ inches
c. one smooth side and one side with knots to 2 ½ inches
d. both sides will have knots to 2 ½ inches in width

_____ 2. Softwood plywood classed for exterior use is:

a. made with waterproof glue
b. made with moisture-resistant glue
c. always designated with a C-D quality
d. always designated with a "plyform" code

_____ 3. Hardwood plywood that has a sound face, but may have small cracks in the core where veneer edge do not meet perfectly are graded as:

a. A
b. A1
c. A2
d. shop utility

May be photocopied for student use

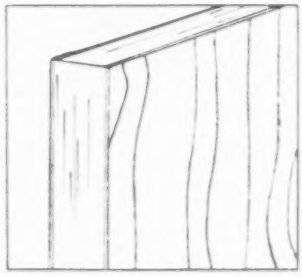
_____ 4. Softwood plywood that permits some minor splits and small tight knots to 1 inch is graded

a. N
b. A
c. B
d. C

_____ 5. Splits are NOT permitted in softwood plywood graded

a. A-A
b. A-B
c. A-C
d. B-B

_____ 6. The core in the picture below is.



a. veneer core
b. lumber core
c. particle-board core
d. fiberboard core

OBJECTIVE 6 **Given a brief description, match types of wood paneling.**

_____ 1. A wood panel made up from wood particles, flakes or strands bonded together is called

a. veneered wood
b. hardwood
c. reconstituted wood
d. softwood

May be photocopied for student use.

_____ 2. Which of the following paneling types is used for exterior siding?

a. Hardboard
b. Waferboard
c. Composite board
d. Flakeboard

_____ 3. Which of the following uses is common for composite board paneling?

a. Exterior siding
b. Underlayment
c. Floor decking
d. Cabinets

_____ 4. Waferboards are commonly used for

a. subfloors
b. exterior siding
c. interior paneling
d. countertops

OBJECTIVE 7

Provided a drawing, select the various types of trim and molding.

_____ 1. The figure shown below represents which of the following types?

a. Cove
b. Quarter round
c. Base shoe
d. Base

May be photocopied for student use

_____ 2. What is the type of molding represented in the drawing below?

a. Base
b. Half-round
c. Cove
d. Chair rail

_____ 3. Which of the following molding types is represented in the drawing below?

a. Quarter rail
b. Half-round
c. Quarter round
d. Corner mold

_____ 4. Which type of molding is shown below?

a. Chair rail
b. Base
c. Wainscot cap
d. Cap molding

May be photocopied for student use.

_____ 5. The type of molding below is

a. Cove molding
b. Base shoe
c. Inside corner
d. Outside corner

OBJECTIVE 8

Given pictures, identify common fasteners and state their primary use.

_____ 1. The figure below represents a _____ nail and is used in

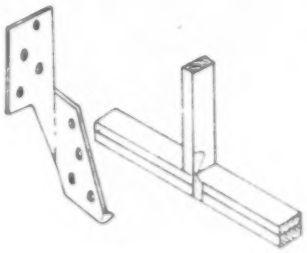
a. finish, finishing trim
b. common, general carpentry
c. box, securing plywood decking
d. duplex, concrete formwork

May be photocopied for student use.

_____ 2. The picture below shows a screw and is used to

a. attach drywall
b. install wood trim
c. secure plywood decking
d. all the above

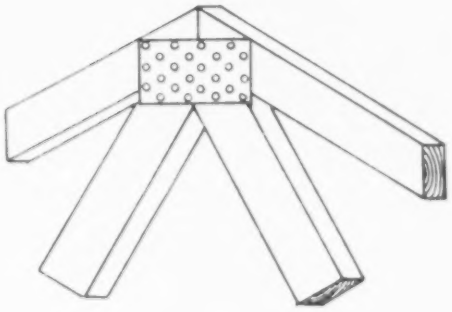
_____ 3. What is the major benefit of using the fastening device shown below?



a. Increases structural strength
b. Costs less than nails alone
c. Used in areas of light wind
d. All the above

May be photocopied for student use

_____ 4. The following figure represents a _____ and is used to reduce labor costs while increasing the _____ of a structure.



a. nail plate, labor cost
b. hanger, strength
c. nail plate, strength
d. clamp plate, strength

NOTE: Objectives 9-10 are evaluated on assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use

WRITTEN TEST ANSWERS	CARPENTRY MATERIALS	A 1

OBJECTIVE 1	1. b	6. a	11. a
	2. a	7. c	12. c
	3. a	8. b	13. b
	4. d	9. d	14. d
	5. b	10. d	15. a
OBJECTIVE 2	1. d	6. b	
	2. b	7. d	
	3. a	8. a	
	4. c	9. c	
	5. a	10. b	
OBJECTIVE 3	1. b	6. a	11. d
	2. d	7. c	12. c
	3. d	8. b	13. a
	4. d	9. a	
	5. b	10. c	
OBJECTIVE 4	1. c	4. c	
	2. c	5. d	
	3. a		

OBJECTIVE 5	1. b	4. b
	2. a	5. a
	3. d	6. b
OBJECTIVE 6	1. c	3. b
	2. a	4. a
OBJECTIVE 7	1. d	4. c
	2. c	5. d
	3. c	
OBJECTIVE 8	1. d	3. a
	2. d	4. c

OBJECTIVE SHEET	CARPENTRY TOOLS	A 2

INTRODUCTION

Being able to recognize the various types of tools and knowing what they are used for is a very small part of the carpentry trade. Knowing how to care for tools, how to use them safely, how to use them properly and efficiently is essential to the carpentry trade.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

The student will show this knowledge by completing the job sheets and the written test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Given a list of terms associated with carpentry tools, match them to their correct definitions.
2. Given a list of alternatives, select guidelines for shop and tool safety.
3. Given a picture, choose the appropriate and safe use of selected carpentry tools.
4. Choose the word or phrase to complete statements about the appropriate and safe use of power tools.
5. Complete a safety test for selected power tools. (Assignment Sheet)
6. Use a hammer. (Job Sheet 1)
7. Use a hand saw. (Job Sheet 2)
8. Use a hacksaw. (Job Sheet 3)
9. Use a framing square and rule to lay out a corner. (Job Sheet 4)

10. Use a level. (Job Sheet 5)

11. Perform a ripping operation with a circular saw. (Job Sheet 6)

12. Drill holes in wood stock. (Job Sheet 7)

13. Operate a pneumatic fastener. (Job Sheet 8)

SUGGESTED ACTIVITIES	CARPENTRY TOOLS	A 2

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials listed in suggested resources.
- Obtain other materials to supplement unit.

  EXAMPLES: Tools, catalogs, samples of the various tools

- Invite a tool salesperson to speak to the students about buying tools, what to look for, compare good tools with cheaper grade tools, difference in cost of good and poor tools and safety rules pertaining to tools.

  NOTE: Provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time.

- Make arrangements for students to visit local hardware stores or lumber yards.
- Make arrangements for audio visual equipment that will be needed for this unit.
- Arrange to have all materials and supplies necessary to complete job sheets.

DELIVERY

Objective 1: Given a list of terms associated with carpentry tools, match them to their correct definitions.

- Discuss terms and definitions.
- Show students examples to illustrate appropriate terms.
- Show slide set, *Tool Identification Slides*.

Objective 2: Given a list of alternatives, select guidelines for shop and tool safety.

- Discuss guidelines for safe use of tools.

- Show the films *Safety in the Shop: Hand Tools*, and *Power and Hand Tool Safety*.
- Have students explain details of accidents they know of when someone used tools improperly.
- Discuss newspaper clippings or case studies that relate to safe tool use.
- Demonstrate to students how to clean and store tools properly.
- Demonstrate how the quantity and quality of work increases when using sharp tools as compared to using dull tools.
- Explain your policy for replacement and repair of damaged tools.
- Outline your tool-management policy for shop and job site.

Objective 3: Given a picture, choose the appropriate and safe use of selected carpentry tools.

- Discuss the various types of tools and their uses.

Objective 4: Choose the word or phrase to complete statements about the appropriate and safe use of power tools.

- Display a sample of various types of tools and discuss the proper use of each; allow students to handle the tools and demonstrate their proper use.
- Caution students to use the correct tool for the job it was designed.

APPLICATION

Objective 5: Complete a safety test for selected power tools. (Assignment Sheet)

Objective 6: Use a hammer. (Job Sheet 1)

Objective 7: Use a hand saw. (Job Sheet 2)

Objective 8: Use a hacksaw. (Job Sheet 3)

Objective 9: Use a framing square and rule to lay out a corner. (Job Sheet 4)

Objective 10: Use a level. (Job Sheet 5)

Objective 11: Perform a ripping operation with a circular saw. (Job Sheet 6)

Objective 12: Drill holes in wood stock. (Job Sheet 7)

Objective 13: Operate a pneumatic fastener. (Job Sheet 8) (Optional—at discretion of instructor.)

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements from pretest results.
- Counsel students individually on pretest results and study requirements.
- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.
- Evaluate students on job sheet activities.
- Complete appropriate section of competency profiles.
- Reteach and reevaluate if necessary.
- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

  NOTE: The written test may be given in sections if desired.

- Give the written test.
- Complete appropriate sections of competency profiles.
- Reteach and retest if necessary.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Safety in the Shop: Hand Tools*. Black and white, 13.5 min., Cornet Films, available from Coronet Films, 65 East Southwater Street, Chicago, IL 60611.
- *Safety in the Shop: Power Tools*. Coronet Films, Inc., 65 E. Southwater Street, Chicago, IL 60611.
- *Tool Identification Slides*. Available from the Oklahoma Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, 1500 West Seventh Avenue, Stillwater, OK 74074.
- *Power and Hand Tool Safety*. ½" VHS Color 21 min. Available from Tel-A-Train, 309 N. Market Street, Chattanooga, TN 37405.

  This program demonstrates proper methods of selection, inspection, and use of hand tools, portable power tools, both on the job and at home. The importance of exercising judgment and control before, during, and after the job is emphasized.

Print Media

- Tool catalogs from various manufacturers

  EXAMPLES: Stanley Tools, Division of the Stanley Works, 600 Myrtle Street, New Britain, CT 06050.

  General Hardware Manufacturing Co., Inc. 80 White Street, New York, NY 10013.

  NOTE: Obtain several catalogs and display for students to review.

UNIT REFERENCES

- *Consumer Products*, Catalog 319. Black & Decker (U.S.) Inc.: Towson, MD.
- *DUO-FAST Construction Tools*. FORM NO. PB-2. Duo-Fast Corporation: Franklin Park, IL.
- *DX350 Instruction Manual*. Hilti Corporation, Hilti Fastening Systems: Tulsa, OK.
- *Heavy Duty Professional Power Tools and Accessories for Construction and Industry*, Catalog NPE-9. Black & Decker Industrial/Construction Division: Hampstead, MD.
- *Makita Tool Catalog*. Makita U.S.A. Inc.: Cerritos, CA.
- *Rockwell Professional Power Tools*, Catalog No. AD-3700. Rockwell International Power Tool Division. Pittsburgh, PA.
- *Stanley Tools Consumer Broad Line Catalog*. South Central Corporate Distribution Center. Dallas, TX.
- *Starrett Precision Tools, Gages and Saws*. The L.S. Starrett Company. Athol, MA.
- Wagner, Willis H. *Modern Carpentry*. The Goodheart-Wilcox Co., Inc. South Holland, IL.
- Willey, Al. *Fundamentals of Carpentry*. Oklahoma Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and The Associated General Contractors of America: Stillwater, OK. 1992.

INFORMATION SHEET	CARPENTRY TOOLS	A 2

OBJECTIVE 1

Given a list of terms associated with carpentry tools, match them to their correct definitions.

- **arbor** – on an electric tool, the rotating shaft or bar that holds cutting tools
- **bevel** — slant or inclination on a surface; sloping edge
- **booster** — powder load used to project fasteners in powder-actuated tools
- **chamfer** — edge of board beveled at 45-degree angle; may be angular or curved
- **dado** — rabbet or groove cut in wood
- **deburr** – to file or grind off small projections on a metal surface after it has been cut
- **door jack** — holder or stand used to hold door on edge while planing, routing, or installing hinges
- **dovetail** — type of interlocking joint
- **drive pin** — fastener used in a powder-actuated tool
- **flute** — concave channel or groove formed or cut into wood member
- **fret** – ornamental pattern with raised or depressed bands that form a continuous rectangular shape
- **grounded** – electrical connection between a piece of equipment and another conducting object or surface, such as the earth, that provides an easy path for electricity to flow if a short occurs
- **hone** — process of sharpening a cutting tool on a stone

- **joint** — intersection of two members
- **kerf** – narrow groove produced by a saw blade

  NOTE: "Kerf" can also mean a small cut equal to the width of the blade used for holding line or for decoration.
- **kickback** — sharp, violent reaction of tool as it rejects material being forced into it
- **miter** — cut made at an angle for joining two pieces of material so that they will form an angle
- **miter box** — device used to guide a saw at the proper angle for cutting a miter joint
- **molding** — wood, plastic or metal used for decorative purposes
- **mortise** — cutout or depression made to receive something such as hinges or locks
- **pocket cut** — cut that removes an interior section of stock
- **protractor** — instrument used to lay out angles
- **push stick** — safety device used to push material through cutters to protect fingers from being cut
- **rabbet** — groove cut in surface or edge of a board to receive another board similarly cut
- **reeding** — type of molding made by cutting or routing close-spaced, parallel, half-round, convex profiles; process of cutting or routing such profiles
- **relief** – variations of heights cut into a flat surface so that figures or forms appear raised
- **relief cut** — cut in stock that keeps blade from binding
- **resawing** — rip thick pieces of stock on-edge to make two or more thinner pieces

- **soapstone** — soft stone having a soapy feel; used for marking metal and masonry
- **try square** — instrument for marking and checking angles

OBJECTIVE 2

Given a list of alternatives, select guidelines for shop and tool safety.

- General Safety Guidelines
  - — Do not attempt to operate any power tool before being checked out by instructor or supervisor for that particular tool.
  - — Always wear eye protection and hard hat when operating all power tools.
  - — Wear face protection when necessary.
  - — Remove jewelry (necklaces, watches, rings)
  - — Wear appropriate clothing for job being done.

    NOTE: Always wear tight-fitting clothing that cannot get caught in the moving tool. Roll up long sleeves, tuck in shirttails, and tie back long hair.
  - — Do not distract others or let anyone distract you while operating a power tool.
  - — Do not engage in horseplay in the shop or at the job site.
  - — Do not run or throw objects in the shop or at the job site.
  - — Consider the safety of others as well as yourself.
  - — Do not leave a power tool running while unattended.
  - — Assume a safe and comfortable position before using a power tool.
  - — Be sure that a power tool is properly grounded before using it.

- Be sure that a power tool is disconnected before performing maintenance or changing accessories.
- Do not use a dull or broken tool or accessories.
- Use a power tool only for its intended use.
- Keep your feet, fingers, and hair away from the blade and/or other moving parts of a power tool.
- Do not use a power tool with guards or safety devices removed.
- Do not operate a power tool if your hands or feet are wet.
- Keep work area clean at all times.
- Use electric extension cords of sufficient size to service the particular power tool you are using.
- Report unsafe conditions to your instructor or supervisor.

• General Guidelines for Power Tool Care

- Keep tools clean and in good working order.
- Keep machine surfaces clean and waxed.
- Follow manufacturer's maintenance procedures.
- Protect cutting edges.
- Keep all tool accessories, such as blades and bits, sharp.
- Always use the appropriate blade for the arbor size.
- Report any unusual noises, sounds, or vibrations to your instructor or supervisor.
- Inspect tools and accessories regularly.
- Keep tools in their proper place when not in use.
- Use the proper blade for the job being done.

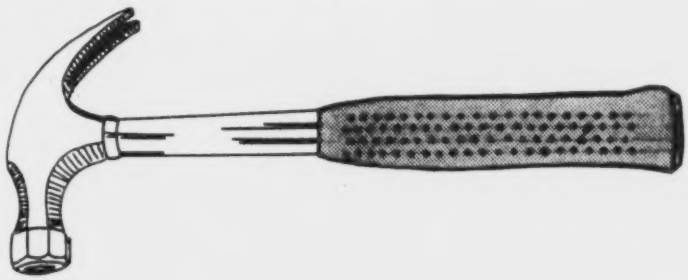
OBJECTIVE 3

Given a picture, choose the appropriate and safe use of selected carpentry tools.

- **Hammers**

  — **curved-claw hammer** — used to drive and pull nails

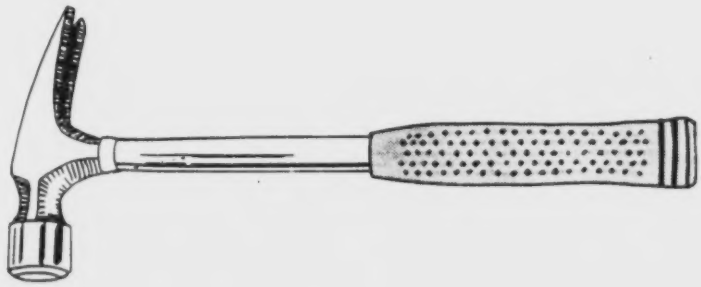
FIGURE 1



Curved-claw hammers weigh from 13 ounces to 20 ounces; handles are made of wood, fiberglass, or steel.

— **straight-claw hammer** — used to drive nails, pull nails, dismantle and wreck

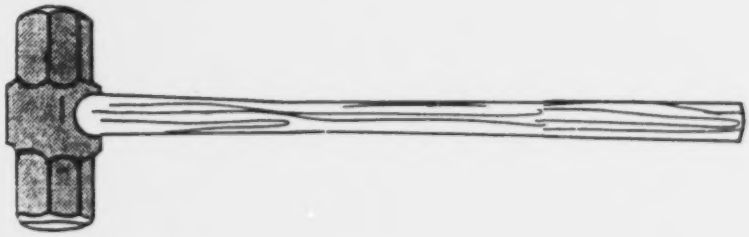
FIGURE 2



Straight-claw hammers weigh from 16 ounces to 21 ounces; straight-claw hammers weighing from 22 ounces to 28 ounces are called *framing hammers.*

— **sledgehammer** — used to drive stakes and break concrete

FIGURE 3

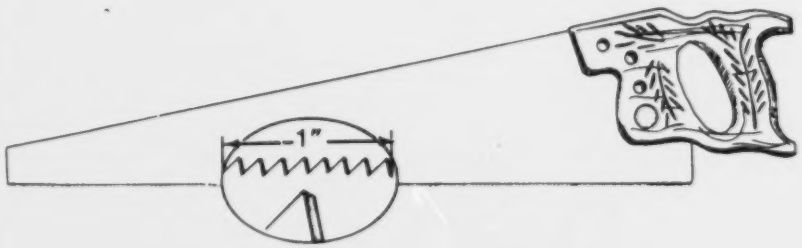


Sledgehammers weigh from 2 pounds to 20 pounds; they have a balanced head with two identical faces.

- **Saws**

— **crosscut saw** — used to cut across the grain of wood

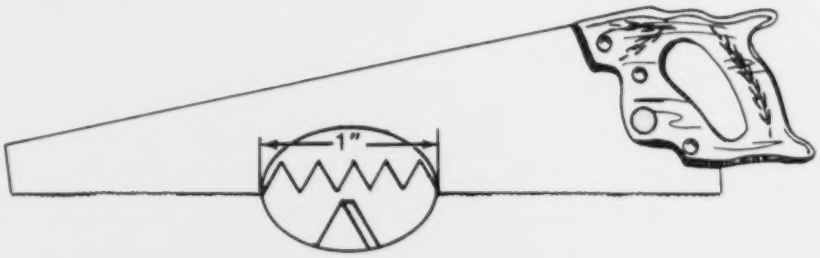
FIGURE 4



Crosscut saws come in lengths of 20 inches to 26 inches with four to twelve points per inch; teeth are filed at an angle across the face.

— **ripsaw** — used to cut with the grain of wood

FIGURE 5



Ripsaws come in lengths of 20 inches to 28 inches with five to seven points per inch; teeth are filed square across the face.

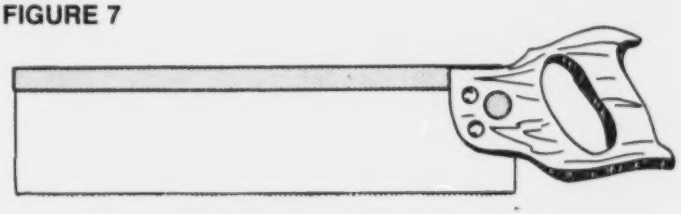
— **dovetail saw** — used to cut smoothest possible joints (tenons, mortises, etc.)

FIGURE 6

Dovetail saws are 10 inches long with seventeen points per inch; they have very fine teeth and an extremely thin steel blade with a rigid steel back to strengthen the blade.

— **backsaw (miterbox saw)** — used to cut fine joints; also used in a miter box to cut miters or square ends

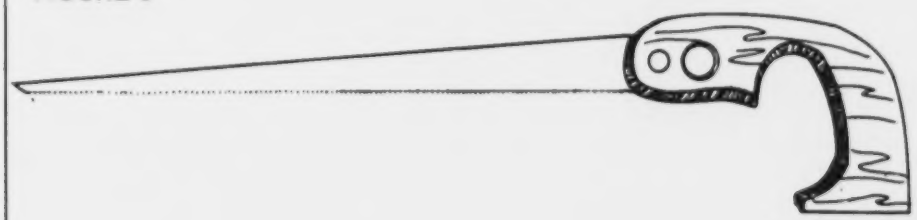
FIGURE 7



Backsaws come in lengths of 12 inches to 28 inches with eleven to thirteen points per inch; they have fine teeth, a thin blade, and a heavy steel band across the back to strengthen the blade.

— **compass saw (keyhole saw)** — used to cut inside corners, curves, circles, and frets

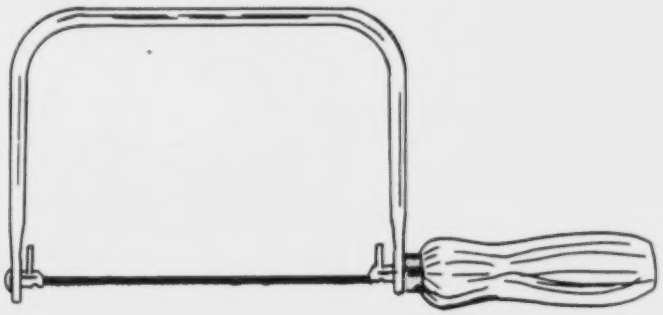
FIGURE 8



Compass saws come in lengths of 10 inches to 14 inches; their tapered blade can be reversed or set in various positions; some have a replaceable blade.

— **coping saw** — used to cut curves and to shape ends of molding and trim for joints

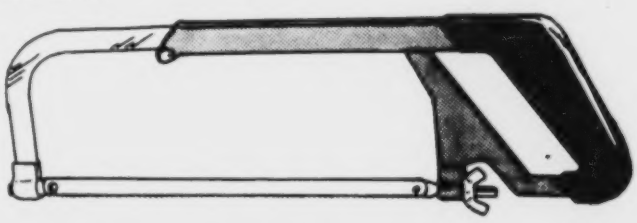
FIGURE 9



The coping saw's U-shaped frame permits cuts as deep as 6¾ inches; blade is replaceable.

— **hacksaw** — used to cut metal

FIGURE 10



Hacksaws have U-shaped frames and replaceable blades that come in lengths of 8 inches to 12 inches.

- **Squares and Accessories**

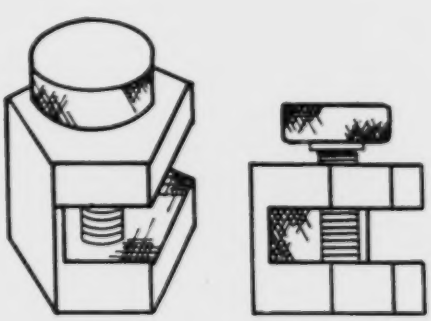
  — **framing square (rafter square)** — used in general framing to lay out walls, partitions, rafters, braces, and stairs

FIGURE 11

Framing squares have a 24-inch-by-2-inch calibrated blade and a 16-inch-by-1½-inch calibrated tongue. Rafter and brace tables are stamped on one blade.

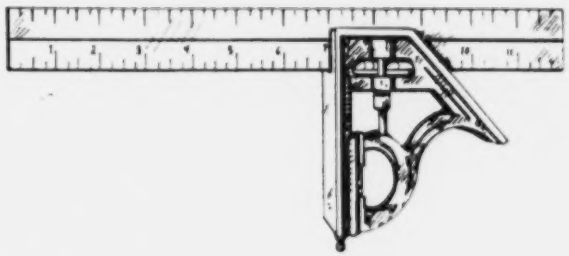
— **stair gauge** — used with framing square to lay out correct angle of riser height and tread run for each step on stair carriage

FIGURE 12



— **combination square** — used to check square and to mark 45-degree miters

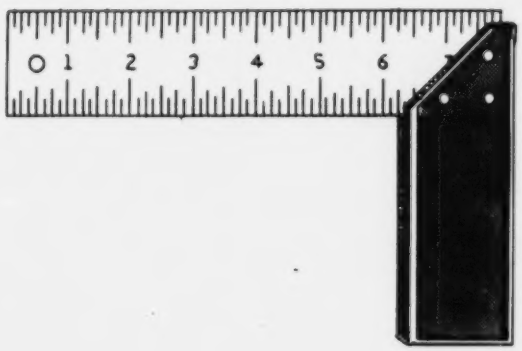
FIGURE 13



Combination squares have a 12-inch blade and an adjustable handle that contains a level vial and a scribe (scratch awl). Handles are made with a 45-degree and a 90-degree side.

— **try square** — used to measure and check 45 and 90-degree angles

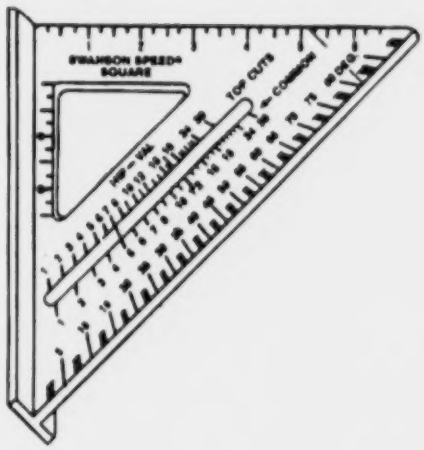
FIGURE 14



Try squares have a 6-inch to 12-inch blade that is graduated every ⅛ inch; their stationary handle comes in lengths of 4⅜ inches to 8 inches.

— **speed square** — used to mark and check angles

FIGURE 15



- **Measuring Instruments**

  — **folding rule** — used to make accurate inside measurements

FIGURE 16

Folding rules come in 6-foot or 8-foot lengths.

— **flexible steel tape** — used to measure irregular as well as regular shapes, and to make accurate inside measurements

FIGURE 17

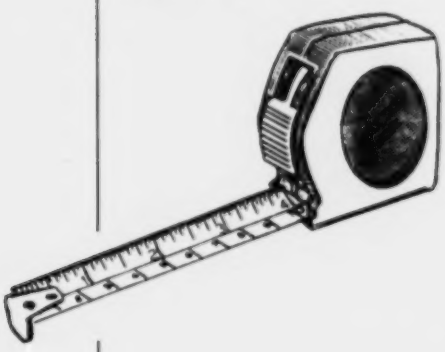


FIGURE 18

Flexible steel tapes slide into a metal case. Most short tapes come in 6-foot to 25-foot lengths; long tapes come in 50-foot to 100-foot lengths. Both types of flexible steel tapes have a hook or loop on the end adjusted to true zero.

- **Levels**

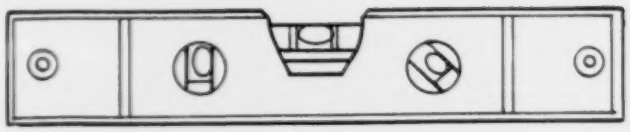
Levels are used to check true horizontal and vertical surfaces of objects.

— **spirit level**

FIGURE 19

— torpedo level

FIGURE 20

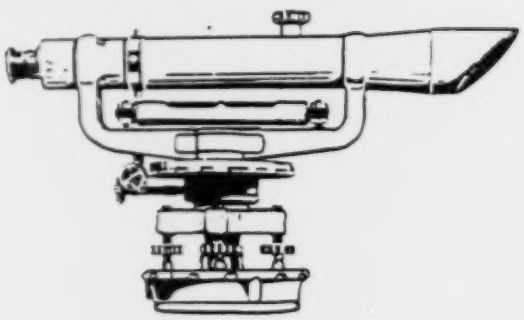


— line level

FIGURE 21

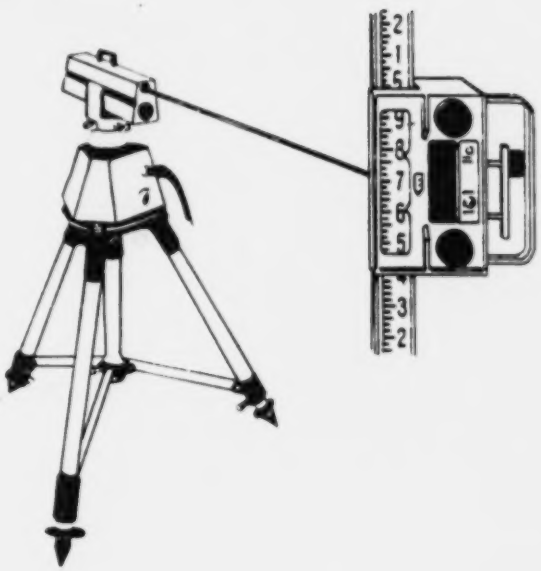
— builder's level

FIGURE 22



— **laser-beam level**

FIGURE 23



— **plumb bob**

FIGURE 24

Plumb bob is an accessory used with leveling instruments to establish exact building points; it is also used to check true vertical plane of building members.

- **Drilling Tools**

  — **power bit (flat bit, spade bit)**

FIGURE 25

Power bits are available in sizes ranging from ¼ inch to 1½ inches and come in 1/16-inch increments. They have become increasingly popular because the shank is ¼ inch on all sizes.

— **twist drill (spiral drill)**

FIGURE 26

Twist drills are used to drill small holes for nails, screws, etc. Most twist-drill sets range from 1/64 inch to ½ inch.

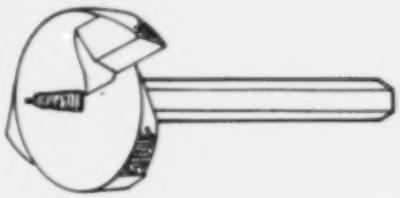
— **auger bit**

FIGURE 27

Auger bits are used to drill holes in wood and other softer materials.

— **lockset bit**

FIGURE 28



Lockset bits are used to make cuts for installing a lock in a door.

— **hole saw**

FIGURE 29

Hole saws consist of a hollow cylinder with teeth around its edge; they are used for cutting round holes.

- **Screwdrivers**

Select a screwdriver that is shaped to fit the screw slot properly and is ground to the correct size. If the screwdriver is too large, it will damage the screw head. If the screwdriver is too small, it will be damaged.

— **standard screwdriver** (flat tip or flat blade screwdriver)

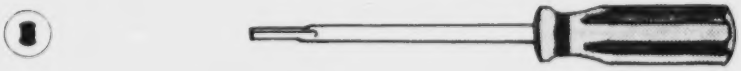
FIGURE 30

— **phillips screwdriver**

FIGURE 31

— **clutch-head screwdriver**

FIGURE 32



— **torx-head screwdriver**

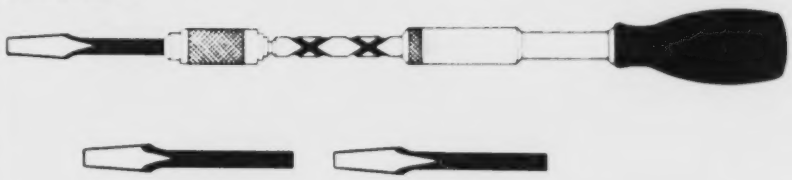
FIGURE 33

— **square-head screwdriver** (Robertson screwdriver)

FIGURE 34

— **spiral ratchet screwdriver** (automatic screwdriver)

FIGURE 35



Spiral ratchet screwdrivers operate with a pushing-up-and-down action rather than with a turning action.

— **standard offset screwdriver**

FIGURE 36

— **phillips offset screwdriver**

FIGURE 37

— **standard screwdriver bit**

Standard screwdriver bits must be used with a hand brace.

FIGURE 38

— **phillips screwdriver bit**

FIGURE 39

- **Pliers**

— **side-cutting pliers** — used to hold, bend, shape,and cut wire

FIGURE 40

— **needle-nose pliers** — used to hold and bend thin wire and metal fittings and to hold small objects in tight places

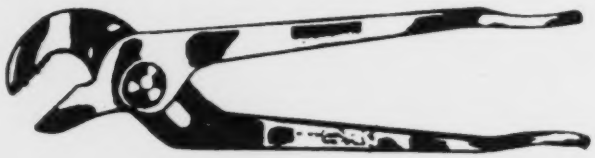
FIGURE 41

— **combination slip-joint pliers** — used to hold and turn small round parts

FIGURE 42

— **channel-lock pliers** — used to hold and turn large round parts

FIGURE 43



- **Wrenches**

In building construction, wrenches are used to set up and adjust machinery and to work with hardware and fasteners.

— **open-end wrench**

FIGURE 44

Open-end wrenches have an accurately machined, nonadjustable opening in each end; sizes of these openings are stamped on the tool. Open-end wrenches are used where there is plenty of clearance for movement.

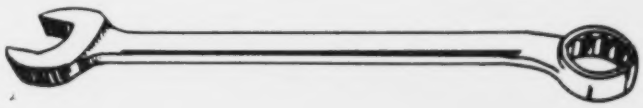
— **box-end wrench**

FIGURE 45

Box-end wrenches have two enclosed, nonadjustable heads that may be offset from 15 degrees to 45 degrees; they are used where there is limited space for movement.

— **combination wrench**

FIGURE 46



Combination wrenches have an open-end wrench at one end and a box-end wrench at the other end.

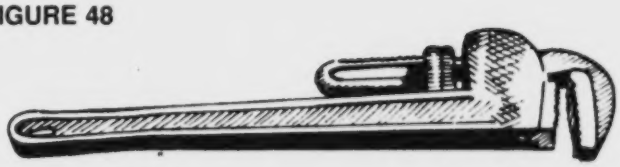
— **adjustable wrench**

FIGURE 47

Adjustable wrenches have one adjustable jaw and one fixed jaw; they are used where there is plenty of clearance for movement.

— **pipe wrench**

FIGURE 48



Pipe wrenches have one fixed jaw and one adjustable jaw; they are used to work on pipes and rods.

— **allen wrench** (hex-key wrench)

FIGURE 49

Allen wrenches are hexagonal steel bars with bent ends; they are used to tighten and loosen set-screws.

— **ratchet wrench and socket**

FIGURE 50

Ratchet wrench/socket

Ratchet wrenches contain a ratchet that allows torque to be applied in one direction only; sockets of various sizes may be attached to the wrench.

- **Files**

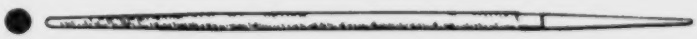
  Files are used to smooth and shape surfaces on which edge-cutting tools cannot be used. Files come in various shapes, sizes, and types of cuts.

  — **flat (mill and bastard)**

FIGURE 51

  — **round**

FIGURE 52



  — **half-round**

FIGURE 53

  — **square**

FIGURE 54

— **triangular** (three-square)

FIGURE 55

— **slitting**

FIGURE 56

— **cant saw**

FIGURE 57

— **knife**

FIGURE 58

— **file handle (used with all files)**

FIGURE 59

- **Chisels**

  Chisels are used for joint construction, for removal or stripping of excess material, and for cutting masonry and steel.

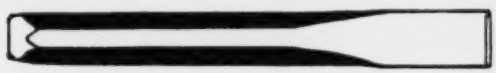
  — **wood chisel**

FIGURE 60

Wood chisels come in blade sizes of ¼-inch to 2 inches in ¼-inch increments.

— **cold chisel (masonry and steel)**

FIGURE 60 A

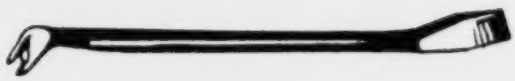


— **stripping chisel**

FIGURE 61

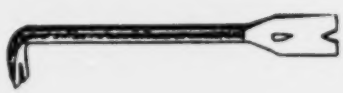
— pry bar

FIGURE 62



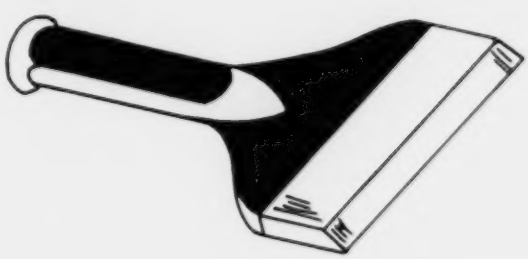
— nail puller

FIGURE 63



— brick chisel

FIGURE 64



- **Clamps**

  Clamps are tools for binding or pressing two or more parts together and holding them firmly in their relative positions; they are often used to hold pieces of wood together while the glue dries.

  — **bar clamp**

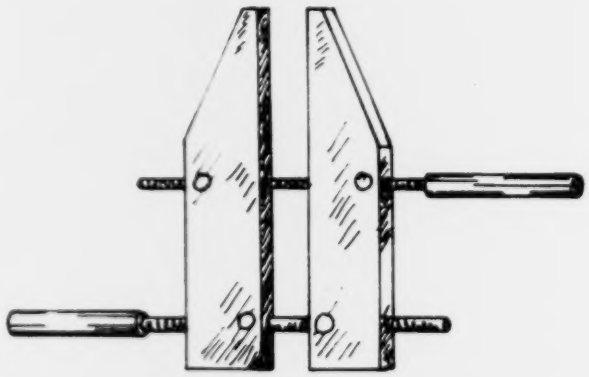
FIGURE 65

  — **C-clamp**

FIGURE 66

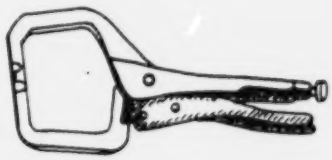
  — **hand-screw clamp**

FIGURE 67



— **locking C-clamp**

FIGURE 68

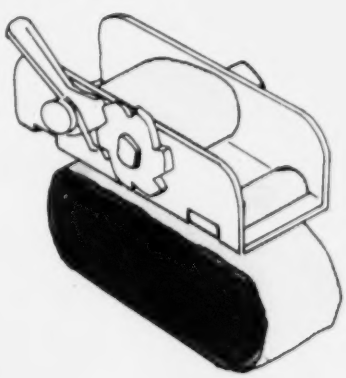


— **spring clamp**

FIGURE 69

— **web clamp** (strap clamp)

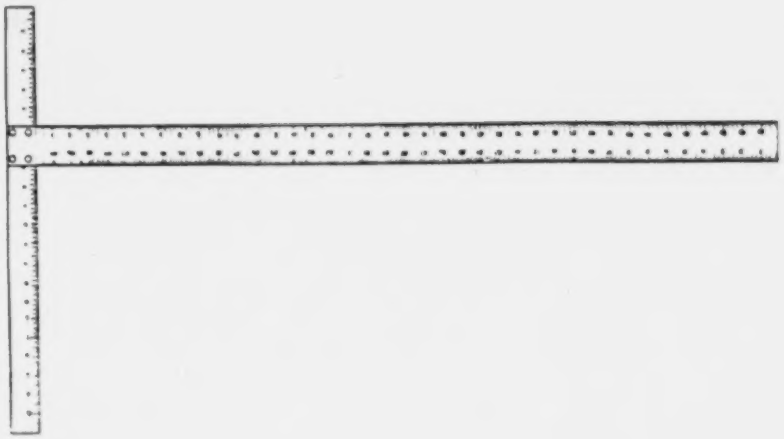
FIGURE 70



- **Drywall Installation Tools**

  — **drywall T-square**

FIGURE 71

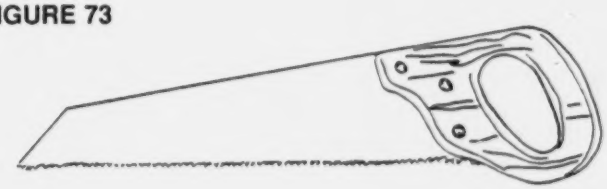


— **utility saw**

FIGURE 72

— **wallboard saw**

FIGURE 73

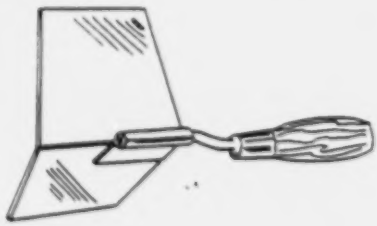


— drywall hammer

FIGURE 74

— outside-corner tool

FIGURE 75



— trowel (curved)

FIGURE 77

— inside-corner tool

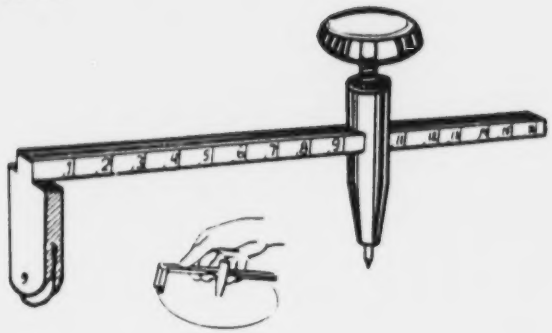
FIGURE 76

— mud pan

FIGURE 78

— circle cutter

FIGURE 79

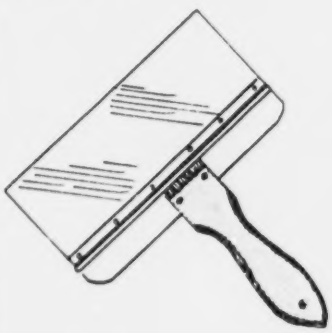


— utility knife

FIGURE 80

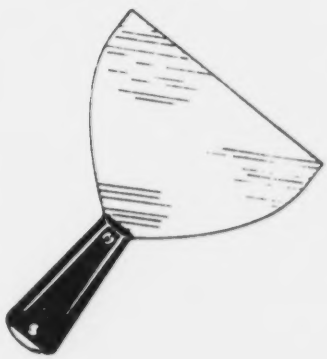
— taping knife

FIGURE 81



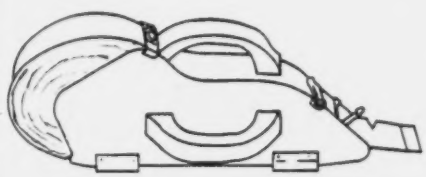
— elastic knife

FIGURE 82



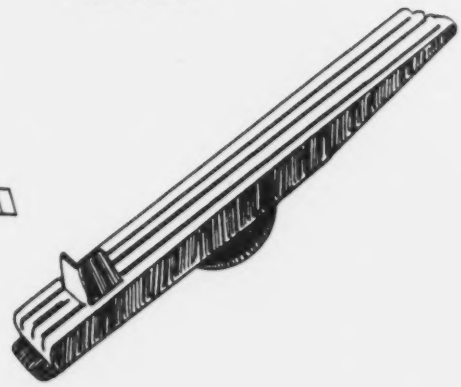
— **taping machine** (banjo)

FIGURE 83



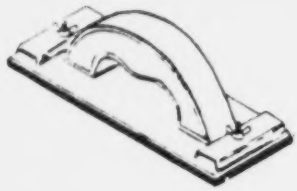
— **drywall lifter**

FIGURE 84



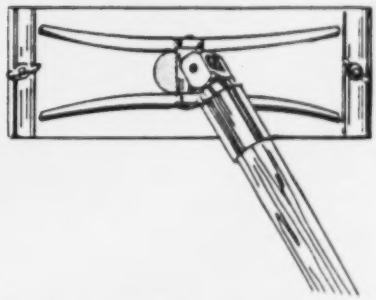
— **hand sander**

FIGURE 85



— **long-handled sander**

FIGURE 86

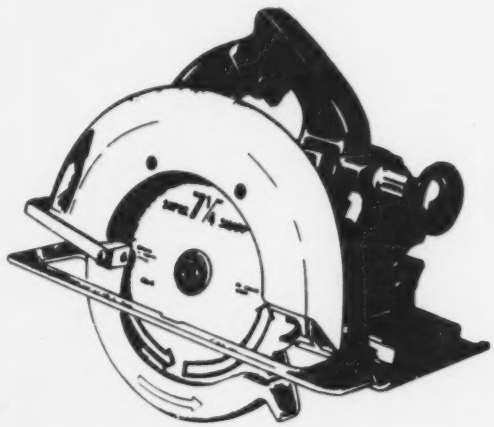


OBJECTIVE 4

Choose the word or phrase to complete statements about the appropriate and safe use of power tools.

- **circular saw**

FIGURE 87



The circular saw is used for:

- ripping
- crosscutting
- making miter cuts
- making pocket cuts
- making bevel cuts

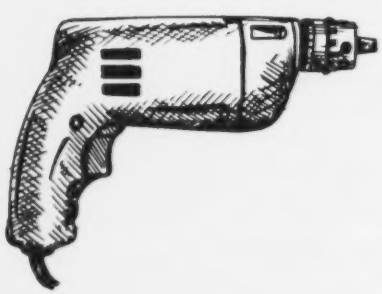
Safe use guidelines:

- Wear safety goggles.
- Hold the saw firmly.
- Always start the saw before making contact with material.
- Keep the electric cord clear of the blade to avoid cutting it.

- Check the condition of the blade and be sure it is secure before starting the saw.
- Be sure the blade guards are in place and working properly.
- Set the blade only deep enough to cut through the material you are using.
- Check stock for nails and any other metal before cutting it.
- Be sure the saw has attained maximum speed before starting the cut.
- Be sure the material being cut is properly supported.
- Keep your hands clear of the blade.
- If the blade binds in a cut, stop the saw immediately and hold it in position until the blade stops, then back it out of the cut.
- Stop the saw and lay it on its base after finishing the cut.

• **drill** **FIGURE 88**

The drill is used for:



- boring and drilling
- cutting holes with hole saw
- mixing materials
- driving screws

Safe use guidelines:

- Wear safety goggles.
- Hold the tool firmly.

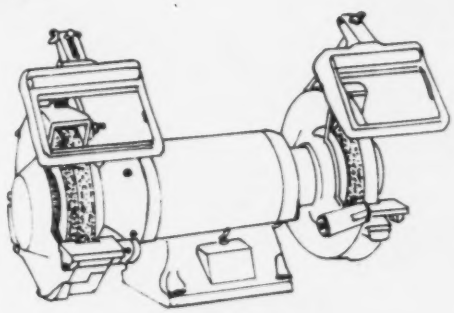
- Always remove the chuck key before starting the drill.
- Be sure the drill or tool is secure in the chuck before starting the drill.
- Never attempt to stop the drill by taking hold of the chuck.
- Do not force the drill into material.
- Be sure the material is properly secured before drilling.
- Never point the drill at anyone.

• **bench grinder**

A bench grinder is used for:

- sharpening tools
- grinding and shaping steel
- grinding burrs and rough places from steel

FIGURE 89



Safe use guidelines:

- Always use the tool rest.
- Be sure tool rest is adjusted properly.
- Never use grinders without safety shields or goggles.
- Never leave grinder until wheel has stopped turning.
- Do not use grinder for woods or plastics.
- Never wear gloves when using a bench grinder.
- Never use a grinder with a cracked or damaged wheel.
- Never force the stock into grinding wheel.
- Never use a grinder to remove paint.

- **angle grinder** **FIGURE 90**

The angle grinder is used for:

- rough sanding
- grinding metal
- grinding concrete
- polishing and buffing
- removing rust and scale from steel
- wire brushing

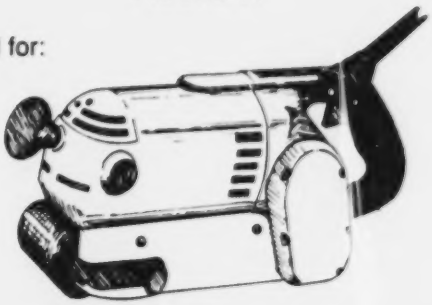
Safe use guidelines:

- Be sure the grinding head is in good condition and properly secured.
- Wear safety goggles.
- Wear gloves when appropriate.
- Use the proper grinding head for the material being ground.

  EXAMPLES: Head for steel, head for concrete

- Be sure the grinder head has stopped turning before laying the grinder down.

- **belt sander** **FIGURE 91**



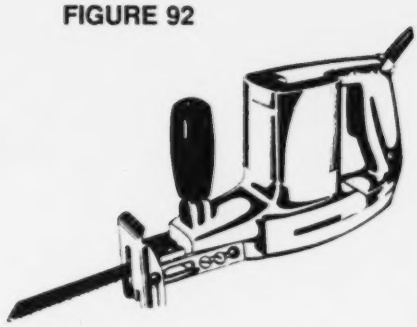
The belt sander is used for:

- rough sanding
- smooth sanding
- grinding glass

Safe use guidelines:

- Hold the sander firmly with both hands.
- Wear safety goggles.
- Always start the sander before making contact with the surface of the material.
- Be sure material to be sanded is properly secured.
- Keep the power cord away from the sander belt.
- Be sure the sander has stopped running before laying it down.

- **reciprocating saw** **FIGURE 92**



The reciprocating saw is used for:

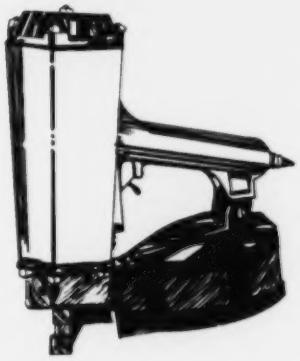
- making irregular cuts
- crosscutting
- making relief cuts
- making inside curves and corner cuts
- making pocket cuts

Safe use guidelines:

- Wear safety goggles.
- Keep your hands clear of the blade.
- Hold the saw firmly.
- Be sure the blade has clearance on the opposite side of the material.
- Keep the electric cord clear of the blade to avoid cutting it.
- Do not force the blade into the material.
- Use the correct blade for the job being done.
- Turn off the saw immediately after finishing the cut.
- Be sure the material being cut is properly supported.

- **pneumatic nailers**

FIGURE 93



The pneumatic nailers are used for:

- applying sheathing
- applying decking
- applying roofing
- installing framing
- installing finish work
- constructing cabinets

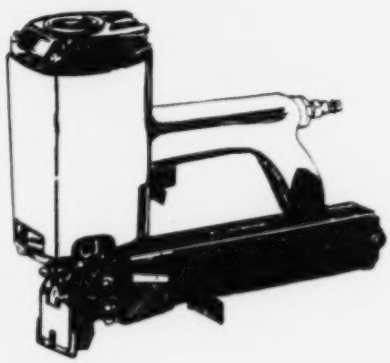
Safe use guidelines:

- Wear safety goggles.
- Be sure all safety devices are in good shape and functioning properly.
- Use pressure specified by the manufacturer.
- Always assume that the fasteners are loaded.
- Never point a pneumatic fastener at yourself or anyone else.
- Be sure the fastener is disconnected from the power source before making adjustments or repairs.
- Use caution when attaching the fastener to the air supply because the fastener may discharge.
- Never leave a pneumatic fastener unattended while it is still connected to the power source.

- Use nailers and staplers only for the type of work for which they were intended.
- Use only nails and staples designed for the fastener being used.
- Never use fasteners on soft or thin materials that nails may go through.

- **pneumatic stapler** **FIGURE 94**

The pneumatic stapler is used for:



- applying sheathing
- applying decking
- applying roofing
- installing insulation
- installing ceiling tile
- installing paneling

Safe use guidelines:

- Wear safety goggles.
- Be sure all safety devices are in good shape and functioning properly.
- Use pressure specified by the manufacturer.
- Always assume that the fasteners are loaded.
- Never point a pneumatic fastener at yourself or anyone else.
- Be sure the fastener is disconnected from the power source before making adjustments or repairs.

- Use caution when attaching the fastener to the air supply because the fastener may discharge.

- Never leave a pneumatic fastener unattended while it is still connected to the power source.

- Use nailers and staplers only for the type of work for which they were intended.

- Use only nails and staples designed for the fastener being used.

- Never use fasteners on soft or thin materials that nails may go through.

- **powder-actuated tool** **FIGURE 95**

The powder-actuated tool is used for:

- driving pins and threaded studs

- fastening wood to concrete

Safe use guidelines:

Before using a powder-actuated tool, the operator must be certified and must possess a safety certification. Certification cards must be issued by an authorized company representative for the tool being used.

- Do not use a powder-actuated tool until you are certified.

  NOTE: See your instructor about certification.

- Follow **all** safety precautions in the manufacturer's instruction manual.
- Always wear safety goggles and a hard hat when operating a powder-actuated tool.
- Use the proper pin size for the job you are performing.
- Use the correct booster according to the selector chart in the toolbox.
- Never hold the end of the barrel against any part of your body or cock the tool against your hand.
- Never hold your hand behind the material you are fastening.
- Do not shoot close to the edge of concrete.
- Never attempt to pry the booster out of the magazine with sharp instrument.
- Always wear ear protection in a confined area.

ASSIGNMENT SHEET	CARPENTRY TOOLS	A 2

Name _____ Score _____

OBJECTIVE 5 **Complete a safety test for selected power tools.**

INTRODUCTION

To operate a power tool correctly, you must know not only the operating instructions but also the specific safety rules for that tool. Before you will be allowed to operate a power tool, you must be able to show that you know the safety rules by completing this assignment sheet with a score of 100 percent.

CIRCULAR SAW

DIRECTIONS

Complete safety rules for portable power saws. Write your answers in the blanks.

Functional Reading Skills
- Follow written instructions

Reading Comprehension Skills
- Apply word analysis techniques (root, prefix, suffix)

Cognitive Activity Skills
- Identify/develop alternatives

1. Wear safety _____.
2. _____ the saw firmly.
3. Always _____ the saw before making contact with _____.
4. Keep the electric cord _____ of the blade to _____ cutting it.
5. Check the condition of the blade and be sure it is _____ before starting the saw.
6. Be sure the blade guards are in _____ and _____ _____.

Job Acquisition/
Development Skills
- Practice good personal presentation

7. Set the blade only _____ enough to _____ through the material you are using.
8. Be sure the saw has attained maximum _____ before _____ the cut.
9. Be sure the material being _____ is properly _____.
10. Keep your _____ clear of the blade.
11. If the blade binds in a cut, stop the saw immediately and hold it in _____ until the blade stops, then back it out of the cut.
12. Stop the saw and lay it on its _____ after finishing the cut.

PORTABLE DRILL

DIRECTIONS

Complete safety rules for a portable drill. Write your answers in the blanks.

1. Wear safety _____.
2. _____ the tool firmly.
3. Always _____ the chuck key before starting the drill.
4. Be sure the _____ or _____ is secure in the chuck before starting the drill.
5. Never attempt to _____ the drill by taking _____ of the chuck.

6. Do not _____ the _____ into the material.

7. Be sure the material is _____ _____ before drilling.

8. Never _____ the drill at anyone.

BENCH GRINDER

DIRECTIONS Complete the safety rules for bench grinder. Write your answers in the blanks.

1. Always use the tool _____.

2. Be sure tool rest is _____ _____

3. Never use grinders without _____

   _____ or _____.

4. Never leave grinder until _____ has stopped turning.

5. Do not use grinders for _ _____ or

   _____.

6. Never wear _____ when using a bench grinder.

7. Never use a grinder with a _____ or

   _____ wheel.

8. Never force the _____ into the grinding wheel.

9. Never use a grinder to remove _____.

PORTABLE ANGLE GRINDER

DIRECTIONS Complete safety rules for a portable angle grinder. Write your answers in the blanks.

1. Be sure the _____ _____ is in good condition and properly secured.
2. Wear safety _____.
3. Wear _____ when appropriate.
4. Use the proper grinding head for the _____ being ground.
5. Be sure the grinder head has _____

   _____ before laying the grinder down.

BELT SANDER

DIRECTIONS Complete safety rules for belt sander. Write your answers in the blanks.

1. Hold the sander firmly with _____

   _____.
2. Wear safety _____.
3. Always _____ the sander before making contact with the surface of the material.
4. Be sure material to be sanded is _____

   _____.
5. Keep the power cord away from the _____

   _____.

6. Be sure the sander has _____ _____ before laying it down.

RECIPROCATING SAW

DIRECTIONS Complete safety rules for reciprocating saw. Write your answers in the blanks.

1. Wear safety _____.
2. Keep your _____ clear of the blade.
3. _____ the saw firmly.
4. Be sure the blade has _____ on the opposite side of the material.
5. Keep the electric cord _____ of the blade to avoid _____ it.
6. Do not _____ blade into the material.
7. Use the _____ _____ for the job being done.
8. Turn off the saw _____ after finishing the _____.
9. Be sure the material being cut is properly _____.

PNEUMATIC NAILERS AND STAPLERS

DIRECTIONS Complete safety rules for pneumatic nailers and staplers. Write your answers in the blanks.

1. Wear safety _____.

2. Be sure all safety devices are in _____

_____ and functioning properly.

3. Use pressure _____ by the manufacturer.

4. Always _____ that the fasteners are loaded.

5. Never _____ a pneumatic fastener at yourself or anyone else.

6. Be sure fastener is disconnected from the _____

_____ before making adjustments or repairs.

7. Use caution when attaching the fastener to the air supply

because the fastener may _____.

8. Never leave a pneumatic fastener _____ while it is still connected to the power source.

9. Use nailers and staplers only for the type of _____

for which they were _____.

10. Use only nails and staples _____ for the

_____ being used.

11. Never use fasteners on _____ or

_____ material that nails or staples may go through.

POWDER-ACTUATED TOOL

DIRECTIONS Complete safety rules for powder-actuated tool. Write your answers in the blanks.

1. Do not use a powder-actuated tool until you are

_____.

2. Follow all safety precautions in the manufacturer's _____ manual.

3. Always wear _____ _____ and a _____ _____ when operating tool.

4. Use the proper _____ size for the _____ you are performing.

5. Use the correct booster according to the _____ _____ in the tool box.

6. Never hold the end of the _____ against any part of your body or _____ the tool against your hand.

7. Never hold your _____ behind the material you are fastening.

8. Do not shoot close to the _____ of concrete.

9. Never attempt to pry the booster out of magazine with a _____ instrument.

10. Always wear _____ protection in a confined area.

ASSIGNMENT SHEET 1

CIRCULAR SAW

1. goggles
2. Hold
3. start, material
4. clear, avoid
5. secure
6. place, working properly
7. deep, cut
8. speed, starting
9. cut, supported
10. hands
11. position
12. base

PORTABLE DRILL

1. goggles
2. Hold
3. remove
4. drill, tool
5. stop, hold
6. force, drill
7. properly secured
8. point

BENCH GRINDER

1. rest
2. adjusted properly
3. safety shields, goggles
4. wheel
5. woods, plastics
6. gloves
7. cracked, damaged
8. stock
9. paint

PORTABLE ANGLE GRINDER

1. grinding head
2. goggles
3. gloves
4. material
5. stopped turning

BELT SANDER

1. both hands
2. goggles
3. start
4. properly secured
5. sander belt
6. stopped running

RECIPROCATING SAW

1. goggles
2. hands
3. Hold
4. clearance
5. clear, cutting
6. force
7. correct blade
8. immediately, cut
9. supported

PNEUMATIC NAILERS AND STAPLERS

1. goggles
2. good shape
3. specified
4. assume
5. point
6. power source
7. discharge
8. unattended
9. work, intended
10. designed, fastener
11. soft or thin

POWDER-ACTUATED TOOL

1. certified
2. instruction
3. safety goggles, hard hat
4. pin, job
5. selector chart
6. barrel, cock
7. hand
8. edge
9. sharp
10. ear protection

JOB SHEET 1	CARPENTRY TOOLS	A 2

OBJECTIVE 5

Use a hammer properly.

INTRODUCTION

The hammer is one of the most used tools in carpentry. This exercise will describe how to use a claw hammer to drive and pull nails.

EQUIPMENT AND SUPPLIES

- Hardhat and goggles
- Claw hammer
- Nails
- Two each 2×4 blocks

PROCEDURE

- Driving nails

	Yes	No
1. Put on safety equipment.	___	___
2. Grasp hammer handle firmly near the end (Figure 96).	___	___

Functional Reading Skills
- Follow written instructions

FIGURE 96

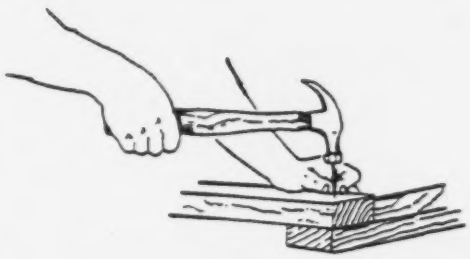
Job Acquisition/ Development Skills
- Master specific job task/procedure

3. Place one 2×4 on top of another 2×4.	___	___

Yes No

4. Rest face of hammer on the nail held in other hand (Figure 97). ___ ___

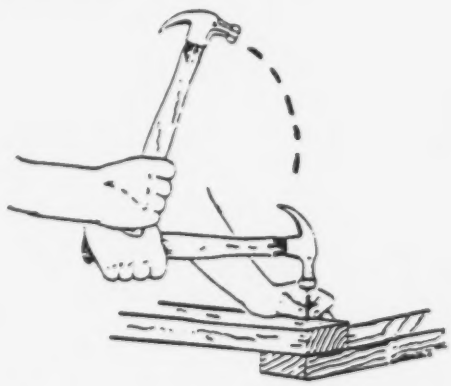
FIGURE 97



5. Raise the head of hammer and give a light tap to start nail and to determine the aim (Figure 98). ___ ___

   NOTE: This maneuver is accomplished through the wrist, elbow, and shoulder with one or all being used according to the strength of the blow to be struck.

FIGURE 98

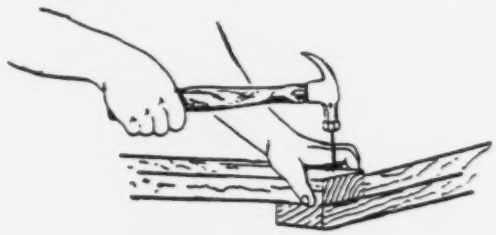


Yes No

6. Strike the nail squarely to avoid marring the wood and bending the nail (Figure 99). — —

   Keep face of hammer clean to avoid its slipping off the nail.

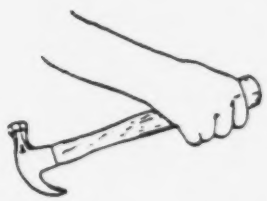
FIGURE 99



- Pulling nails

  1. Grasp hammer handle firmly near the end, just opposite from the grasp used for driving nails (Figure 100) — —

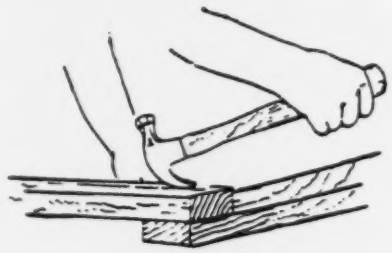
FIGURE 100



Yes No

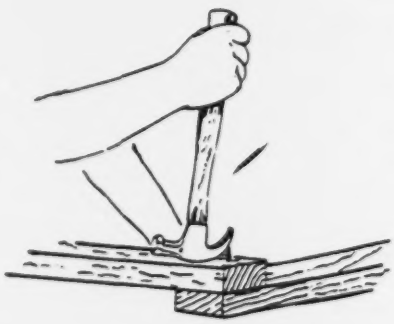
2. Slip claw of the hammer under the nail head and apply pressure (Figure 101). ___ ___

FIGURE 101



3. Continue applying pressure by pulling back on the handle until the handle is nearly vertical (Figure 102). ___ ___

FIGURE 102



4. This concludes this job sheet. Ask your instructor to evaluate your work. ___ ___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Used safety equipment	4	3	2	1
Grasped hammer by end	4	3	2	1
Started nail properly	4	3	2	1
Avoided marring of wood	4	3	2	1
Drove nail straight	4	3	2	1
Pulled nail properly	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 2	CARPENTRY TOOLS	A 2

OBJECTIVE 6

Use a hand saw.

INTRODUCTION

This exercise allows you to practice using a hand saw to cross cut (across the wood grain) and rip (with the wood grain) lumber.

EQUIPMENT AND SUPPLIES

- Hardhat and goggles
- Cross cut hand saw
- Rip hand saw
- Pencil
- Saw horses (2 each)
- 2×4 approximately 4′ long
- 1×6 approximately 4′ long
- Square
- Wedge

PROCEDURE

Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job task/procedure

- Cross cutting lumber

	Yes	No
1. Put on your safety equipment.	___	___
2. Using a square, mark a line across one end of a 2×4.	___	___
3. Firmly grasp the cross cut hand saw.	___	___

General
Science Skills
- Use scientific instruments (type)

Yes No

4. Place one knee on 2×4 to hold it firmly in place; align saw blade with mark (Figure 103). ___ ___

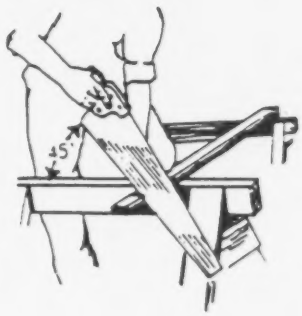
FIGURE 103

5. Position saw at about 45-degree angle between the sawhorse and the 2×4 and start the cut by drawing the saw backward, then forward (Figure 104). ___ ___

Yes No

NOTE: Always cut on the waste side of the mark. This will ensure the lumber to be used will be the correct length.

FIGURE 104



6. Hold blade of saw square to the stock, and steady the blade at the mark with your thumb.

7. Continue these procedures until the cut is made. ___ ___

- Rip cutting lumber

1. Lay piece of 1×6 to be cut across the two sawhorses. ___ ___

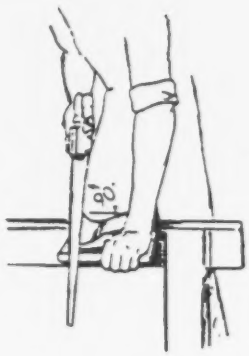
2. Mark a line lengthwise on the 1×6. ___ ___

3. Grasp hand saw firmly by the handle. ___ ___

Yes No

4. Place one knee on the 1×6 to hold it firmly in place; align saw blade with mark, steadying the saw with your thumb and keeping it at a 90-degree angle (Figure 105) ___ ___

FIGURE 105



5. Start the cut by drawing the saw backward, then moving it forward while keeping the saw at a 60-degree angle with the 1×6 (Figure 106). ___ ___

   NOTE: Always cut on the waste side of the mark.

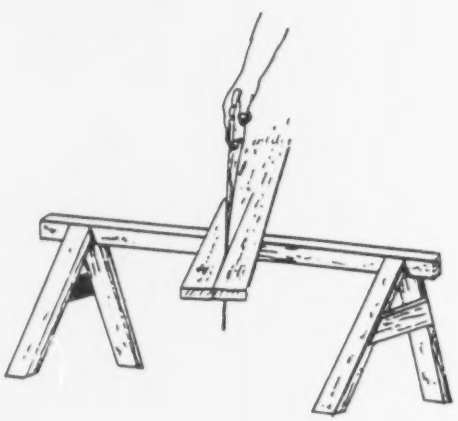
Yes No

FIGURE 106

6. Continue following the above procedures to rip the board. ___ ___

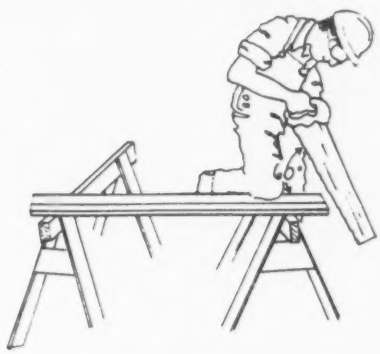
7. If the saw wanders from the line, twist the handle slightly and draw it back to the line (Figure 107). ___ ___

FIGURE 107



	Yes	No
8. If the saw is not square to the stock, bend it slightly and gradually straighten it; but be very careful not to kink the blade.	___	___
9. After cutting several inches in from the end of the board, remove the saw, slide the board back, and then reinsert the blade into the saw kerf and continue cutting; if the blade binds, you may need to insert a small wedge in the saw kerf (Figure 108).	___	___

FIGURE 108



10. Continue sawing board until cut is completed.	___	___
11. Have your instructor check your work.	___	___
12. Clean up work area, and put away tools and materials.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Safety equipment used	4	3	2	1
Lumber cut squarely	4	3	2	1
Saw held at correct angle	4	3	2	1
Wedge used correctly	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 3	CARPENTRY TOOLS	A 2

OBJECTIVE 8

Use a hacksaw.

INTRODUCTION

Learning to use a hacksaw properly will help you to produce a much better job and will probably keep you from injuring yourself. See caution in the job sheet.

EQUIPMENT AND SUPPLIES

- Safety goggles
- Steel tape or folding rule
- Soapstone
- Clamping devise
- Hacksaw
- One-inch reinforcing rod, 36 inches long
- File or grinder

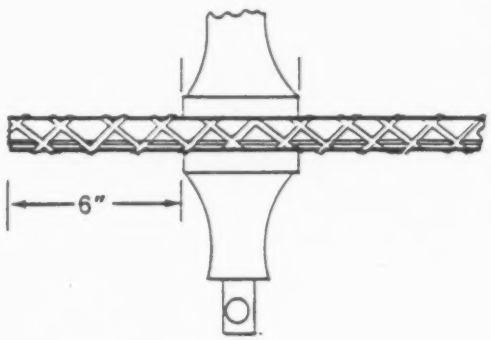
PROCEDURE

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures

	Yes	No
1. Secure rod firmly so that about 6 inches extend past edge of vise.	___	___

FIGURE 109

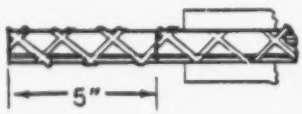


Functional Math Skills
- Make measurements

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

	Yes	No
2. Use tape or rule to measure; mark a 5-inch length on rod with soapstone.	___	___

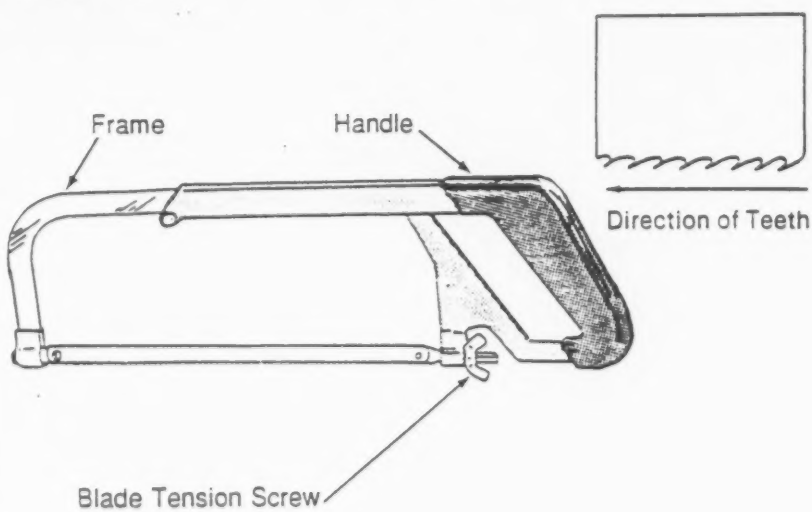
FIGURE 110



3. Put on safety goggles.	___	___
4. Check hacksaw to make sure that blade is tight and that teeth are sharp and facing the right direction.	___	___

NOTE: For most general-purpose work, use a blade that has twelve teeth per inch; however, a fine-tooth blade should be used to cut thin metal. When selecting saw blades, keep in mind the three-tooth rule—at least three teeth in contact with work.

FIGURE 111



	Yes	No
5. Put the saw blade on the soapstone mark.	___	___
6. Hold the saw firmly by the handle and front of the frame.	___	___
7. Cut with a forward and back movement, making about forty strokes per minute; apply pressure on forward strokes, and lift the saw slightly on return strokes.	___	___

NOTE: Cut on forward movement only, and use the entire length of blade.

CAUTION: When the saw is about to cut through the stock, ease up on the pressure. Otherwise, you may push your hand into the sharp edge of the rod still held in the vise.

8. Use a file or grinder to deburr cut end of both pieces of reinforcing rod.	___	___
9. Have your instructor check your work.	___	___
10. Put away tools and leftover rod; clean up work area.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Rod cut properly and burrs removed	4	3	2	1
Time standard for a 4 rating is 10 minutes or less	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 4	CARPENTRY TOOLS	A 2

OBJECTIVE 9

Use a framing square and rule to lay out a corner.

INTRODUCTION

Pencil, rule, and square; these three tools are probably the most basic tools that a carpenter will ever use, yet they are probably the most important. More mistakes have been made with these three tools than any other three tools, which is the reason for learning to use these tools properly. Part of that learning is to recheck your work very carefully.

EQUIPMENT AND SUPPLIES

- Framing square
- Folding rule or steel tape
- Pencil
- Chalkline

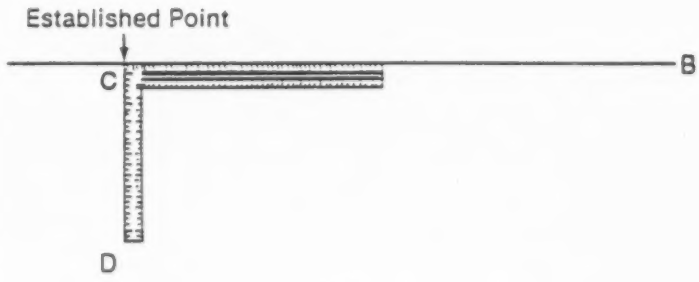
PROCEDURE

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Apply geometry principles

	Yes	No
1. Place framing square on the floor at Point C to square off a line (Figure 112).	___	___
NOTE: Instructor will establish Point C.		
2. Mark line CD along edge of framing square.	___	___

FIGURE 112

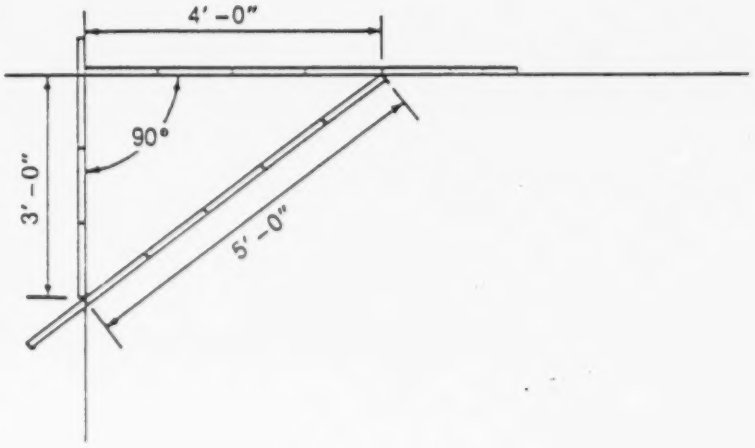


votech

Job Acquisition/
Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

	Yes	No
3. Snap a chalkline from Point C along line CD to extend several feet past point D.	___	___
4. Use rule and 3-4-5 method to check square of corner.	___	___

FIGURE 113



5. Recheck work.	___	___
6. Have your instructor check your work.	___	___
7. Clean work area; put away tools and equipment.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Measurements correct	4	3	2	1
Layout is square on floor	4	3	2	1
Time standard for a 4 rating is 15 minutes or less	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 5	CARPENTRY TOOLS	A 2

OBJECTIVE 10

Use a level.

INTRODUCTION

Levels are very delicate instruments and must be handled carefully to ensure accuracy. Levels should be checked for accuracy periodically and before use, especially if the instrument has been dropped or jarred.

EQUIPMENT AND SUPPLIES

- Four-foot spirit level
- Folding rule or steel tape
- Pencil
- Straightedge
- Vertical and horizontal work surface
- Level surface

PROCEDURE

Functional Reading Skills
- Follow written instructions

Data Analysis and Display Skills
- Interpret graphs

Job Acquisition/ Development Skills
- Master specific job task/procedure

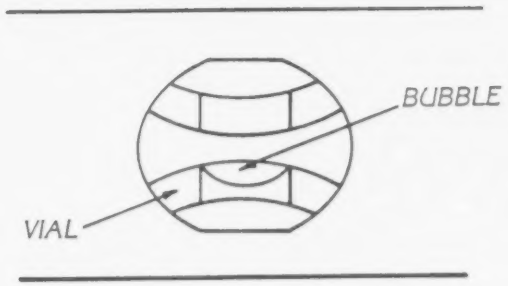
		Yes	No
1.	Check level for accuracy.		
a.	Set base of level on flat, horizontal surface.	___	___
b.	Check bubble position in horizontal vial.	___	___
c.	Adjust surface or location of level until bubble is centered; mark position on surface.	___	___

NOTE: On a level surface, the bubble will lie evenly positioned between the lines on the vial. See Figure 114.

- Complete job-related applications
- Practice good work habits/attitudes

Yes No

FIGURE 114



d. Rotate the level end for end and position it on the exact location; use the bottom bubble. ___ ___

FIGURE 115

e. Check bubble position in the horizontal vial. ___ ___

NOTE: The bubble will be centered from this side also if the level is accurate.

f. Replace or repair level as necessary. ___ ___

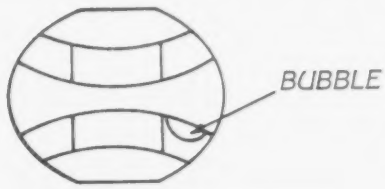
2. Level a surface.

a. Visually check surface for irregularities and foreign matter such as dirt. ___ ___

	Yes	No
b. Clean or replace surface as necessary.	___	___
c. Set base of level carefully and squarely on surface.	___	___
d. Check bubble position.	___	___

NOTE: The bubble will be displaced toward the high end of the level (Figure 116).

FIGURE 116



e. Adjust surface as necessary.	___	___
f. Take additional readings to level surface as required.	___	___

NOTE: Many factors, such as the type of surface and the material being used, affect the number of readings that are required.

PROCEDURE FOR PLUMBING

Plumb a vertical surface.

1. Check level for accuracy.

a. Place base of level against flat, vertical surface (See Figure 117).	___	___

votech

Yes No

b. Check bubble position in upper horizontal vial. ___ ___

c. Adjust surface or location of level until bubble is centered; mark position on surface. ___ ___

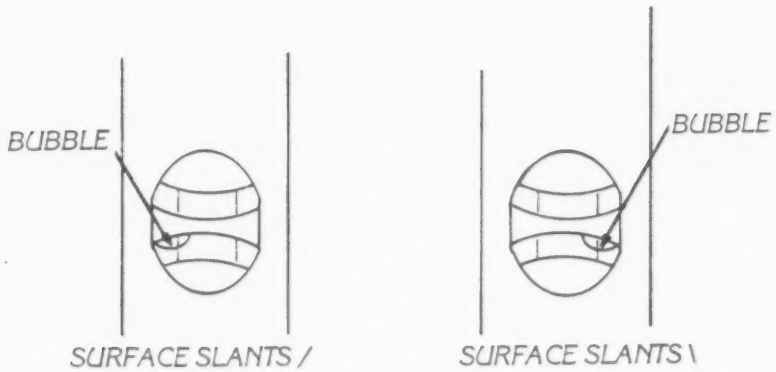
FIGURE 117 **FIGURE 118**

d. Rotate the level, end for end, and position it on the exact location of the bubble-centered reading. (Figure 118) ___ ___

	Yes	No
e. Check bubble position in the upper horizontal vial.	___	___
NOTE: The bubble will be centered at this end also if level is accurate.		
f. Replace or repair level as necessary.	___	___
2. Plumb a surface.		
a. Visually check surface for irregularities and foreign matter such as dirt.	___	___
b. Clean or replace surface as necessary.	___	___
c. Place base of level carefully and squarely against surface.	___	___
d. Check bubble position in upper vial.	___	___
NOTE: The bubble will move toward one end of the vial if the surface is not plumb. To plumb the surface, you must adjust it in the direction of bubble displacement. See Figure 119.		

Yes No

FIGURE 119



e. Adjust surface as necessary. ___ ___

f. Take additional readings to plumb as required. ___ ___

3. Have your instructor check your work. ___ ___

4. Clean work area; put away tools and equipment. ___ ___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Accuracy of level verified	4	3	2	1
Surface is level	4	3	2	1
Vertical surface is plumb	4	3	2	1
Time standard for a 4 rating is 10 minutes or less	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 6	CARPENTRY TOOLS	A 2

OBJECTIVE 11

Perform a ripping operation with a circular saw.

INTRODUCTION

This exercise allows you to improve your use of safety equipment and safe work habits. The circular saw is an important tool in carpentry, and you should strive to use it safely and effectively.

EQUIPMENT AND SUPPLIES

- Safety goggles and hard hat
- Circular saw
- Folding rule or tape
- Pencil
- Sawhorse or other solid support
- Five 6″ × 12″ pieces of ¾-inch plywood

PROCEDURE

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English and metric measures

Functional Math Skills
- Make measurements

CIRCULAR SAW

		Yes	No
1.	Check to see that the automatic blade guide is free and retractable.	___	___
2.	Install a rip blade on the saw and adjust it to the proper depth.	___	___
3.	Plug the saw into the power source, making sure the saw is grounded.	___	___
4.	Secure the stock on a solid support.	___	___
5.	Put on safety goggles and hard hat.	___	___
6.	Check to be sure the blade is clear of the stock before starting the saw.	___	___
7.	Check with your instructor for approval before starting the saw.	___	___

General
Science Skills
- Use scientific instruments

	Yes	No
8. Start the saw and let it gain maximum speed.	___	___
9. Advance the saw slowly but firmly into stock.	___	___
10. Turn off the saw immediately after the cut is completed.	___	___
11. Check to be sure the blade guard has returned to its proper position.	___	___
12. After the blade has stopped turning, lay the saw on its base.	___	___
13. Remove the stock, and discard scrap in the proper receptacle.	___	___
14. Unplug the saw from the power source.	___	___
15. Remove safety goggles and hard hat.	___	___
16. Clean your work area and put away tools.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Used safety equipment	4	3	2	1
Operated saw properly	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 7	CARPENTRY TOOLS	A 2

OBJECTIVE 12

Drill holes in wood stock.

INTRODUCTION

Using a portable drill is a very common activity in construction. This procedure allows the student to practice the safe use of drills and the proper use of clamps.

EQUIPMENT AND SUPPLIES

- Safety goggles and hard hat
- Portable drill and chuck key
- Drills (various sizes) and auger bit
- Drill vise or clamps
- Stock to be drilled such as blocks of scrap wood
- Table or work bench

PROCEDURES

Functional Reading Skills

- Follow written instructions

Job Acquisition/ Development Skills

- Master specific job task/procedure
- Practice good work habits/attitudes

	Yes	No
DRILLING		
1. Put on safety equipment.	___	___
2. Check to see that power is off.	___	___
NOTE: Some drills have locking triggers.		
3. Install the correct drill into the chuck; tighten with chuck key; remove chuck key.	___	___
4. Lay out hole on stock to be drilled.	___	___

	Yes	No
5. Place a scrap block of wood on the table.	___	___
NOTE: This block of wood prevents the stock from splintering when the drill goes through the work and will also prevent damage to the drill by not letting it contact the table.		
6. Plug the power cord into an outlet.	___	___
7. Clamp stock firmly to table.	___	___
8. Position the drill so it will center on the layout mark.	___	___
9. With the drill at a 90° angle to the stock, squeeze the drill trigger.	___	___
10. Slowly, but firmly, push the drill into stock.	___	___
11. Continue drilling into stock until hole is completed.	___	___
NOTE: when making deep cuts, it is a good practice to back the drill out of the work now and then to clear the wood chips from the drill.		
12. Back the drill out of the hole as you release the drill trigger.	___	___
13. Remove safety goggles to inspect the stock.	___	___
14. Remove the stock from the clamps.	___	___
15. Unplug the power cord and remove drill from the portable drill.	___	___

	Yes	No
16. Have your instructor check your work.	___	___
17. Clean your work area and put away tools and equipment.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Hole drilled at 90°	4	3	2	1
Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Completed task	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training

3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required

2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill

1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 8	CARPENTRY TOOLS	A 2

OBJECTIVE 13 — **Operate a pneumatic fastener.**

INTRODUCTION

A pneumatic fastener can be very dangerous if not properly used. Its safe use greatly increases the effectiveness of the carpenter. This exercise must be closely supervised by your instructor to ensure safe operation.

EQUIPMENT AND SUPPLIES

- Safety goggles and hard hat
- Pneumatic fastener
- Electric air compressor with air hose
- Fasteners (nails) designed for the fastener being used
- Two 2×s, 4 feet long
- Manufacturer's instruction manual

PROCEDURE

Functional Reading Skills
- Follow written instructions

General Science Skills
- Investigate/apply technology

Physical Science Skills
- Investigate/apply physical laws

		Yes	No
1.	Check to see that all safety devices are in place.	___	___
2.	Plug air compressor into a power source.	___	___
3.	Put on safety goggles and hard hat.	___	___
4.	Start the air compressor.	___	___
5.	Adjust the regulator to the pressure specified by the manufacturer for material being used.	___	___
6.	Load the fastener with nails.	___	___
7.	Hold the fastener so that the discharge end is pointed down and away from anyone.	___	___

Job Acquisition/
Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

	Yes	No
8. Connect the air hose to the fastener.	___	___

CAUTION: Be sure that both hands are clear of discharge end.

9. Check with your instructor for approval before using fastener.	___	___
10. Check to see that everyone is clear of the fastener.	___	___
11. Position the two pieces of stock to be fastened together.	___	___
12. Position the fastener firmly on the stock to be connected and pull the trigger.	___	___
13. Continue discharging nails until the project is complete.	___	___
14. Disconnect air hose from the fastener.	___	___
15. Turn off air compressor and disconnect it from the power source.	___	___
16. Remove safety goggles and hard hat.	___	___
17. Ask your instructor to evaluate your work.	___	___
18. Clean your work area and put away tools and equipment.	___	___

(End of Job Sheet)

SKILL TEST RECORD

votech

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Followed procedure instructions	4	3	2	1
Observed safety guidelines	4	3	2	1
Completed task	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

WRITTEN TEST	CARPENTRY TOOLS	A 2

Name _____ Score _____

OBJECTIVE 1

Given a list of terms associated with carpentry tools, match them to their correct definitions. Write the letter that corresponds to the most correct answer.

_____ 1. Which of the following terms describe a safety device used to push material through cutters to protect fingers?

a. Miter box
b. Finger stick
c. Dovetail
d. Push stick

_____ 2. What is the process of sharpening a cutting tool on a stone?

a. Fret
b. Hone
c. Slip stone
d. Bevel

_____ 3. The powder load used to project fasteners in powder-actuated tools is called a/an

a. booster
b. shell
c. load
d. charge

_____ 4. The term to describe a groove cut in wood is to receive another piece is a

a. dado
b. chamfer
c. bevel
d. miter cut

May be photocopied for student use.

_____ 5. An interlocking joint is known as a/an

a. kickback
b. projection
c. dovetail
d. miter cut

_____ 6. Which of these terms best describe the sharp, violent reaction of a tool as it rejects material being forced into it?

a. Jerk reaction
b. Back-burst
c. Kickback
d. Forced rejection

_____ 7. A slant or inclination on a surface; a sloping edge is called a/an

a. dado
b. dovetail
c. flute
d. bevel

_____ 8. An instrument used for marking and checking angles is called a/an

a. reeding bar
b. try miter
c. miter box
d. fret

_____ 9. What is the term used to describe a cut in stock that keeps blades from binding?

a. Cut-back
b. Rabbet
c. Relief cut
d. Fret cut

May be photocopied for student use

_____10. Which of the following terms best describe a device used to guide a saw at the proper angle for cutting material?

a. Miter box
b. Try miter
c. Bevel marker
d. Chamfer box

_____11. The intersection of two members is a

a. chamfer
b. rabbet
c. flute
d. joint

_____12. Reeding is a type of

a. molding
b. cut
c. tool
d. bevel

_____13. An electrical connection that provides an easy path for electricity to flow to the earth if a short occurs is a

a. flute
b. deadman
c. ground
d. conduit

_____14. Variations of heights cut into a flat surface so that figures or forms appear raised is known as

a. kerf
b. fret
c. pattern
d. relief

_____15. The narrow groove produced by a saw blade is the

a. mortise
b. dovetail
c. kerf
d. arbor

May be photocopied for student use.

OBJECTIVE 2

Given a list of alternatives, select guidelines for shop and tool safety. Write the letter of the correct answer in the blank.

_____ 1. When using power tools, you must *always* wear

a. a hard hat and steel-toed boots
b. steel-toed boots
c. eye protection and a hard hat
d. gloves and a hard hat

_____ 2. Do not use a power tools with guards or _____ _____ removed.

a. safety devices
b. power charger
c. adaptor cable
d. optional accessories

_____ 3. Which of the following guidelines for power tool care are recommended?

a. Follow manufacturer's maintenance procedures.
b. Protect cutting edges.
c. Keep tools in their proper place when not in use.
d. All of the above.

_____ 4. Guards and safety devices

a. may be moved when necessary
b. must never be removed
c. should be kept clean and polished
d. should be replaced annually

_____ 5. If you are going to operate a circular saw and your feet are wet,

a. stand on a nonconducting surface
b. remove your shoes
c. report an unsafe condition to your instructor
d. do not operate the saw

May be photocopied for student use

_____ 6. Machine surfaces should be cleaned and

a. oiled
b. waxed
c. buffed
d. free of marks

_____ 7. Power tools must not be left running while unattended, must be disconnected before performing maintenance or changing accessories, and must be

a. grounded
b. in warranty
c. no more than 3 years old
d. operating with at least 50% capability

_____ 8. The correct position for operating a power tool is

a. whatever is safe and comfortable
b. at eye level
c. feet apart and balanced
d. relaxed

_____ 9. The work area should

a. have everything in easy reach
b. be kept clean at all times
c. be cleaned before leaving the shop
d. be comfortable

_____10. Throwing a wrench to another worker is

a. considered horseplay
b. acceptable in some circumstances
c. cause for dismissal
d. unsafe

_____11. Tools and accessories should be inspected

a. daily
b. weekly
c. monthly
d. regularly

May be photocopied for student use.

_____12. Wear eye protection and hard when

a. necessary
b. operating all tools
c. operating all power tools
d. operating tools that throw particles

_____13. Wear face protection when

a. necessary
b. required by operator's manual
c. operating all power tools
d. operating all tools

_____14. When using electrical extension cords,

a. have no more than one tool on a cord
b. have no more than one tool on a circuit
c. use cords that are the right size for the tool
d. use cords no longer than 25 feet long

_____15. Who is wearing the MOST APPROPRIATE clothing?

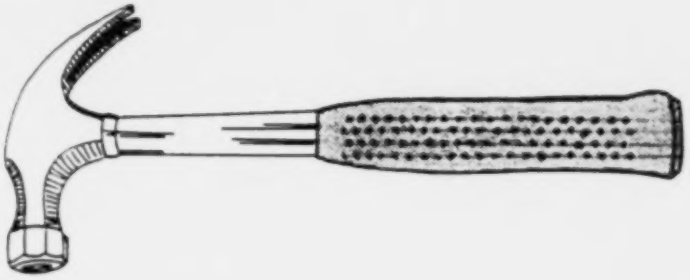
a. Rick, who has his hair in a ponytail and wears sandals, stone-washed jeans and a T-shirt
b. Mary, who has her long hair down, and wears flats, a bulky sweater, and tights
c. Phil, who wears tight jeans, a cowboy shirt tucked into his pants, cowboy boots, and a bandanna tied loosely around his neck
d. Jennifer, who has short hair, and wears a tucked-in T-shirt, jeans, and boots

May be photocopied for student use

OBJECTIVE 3

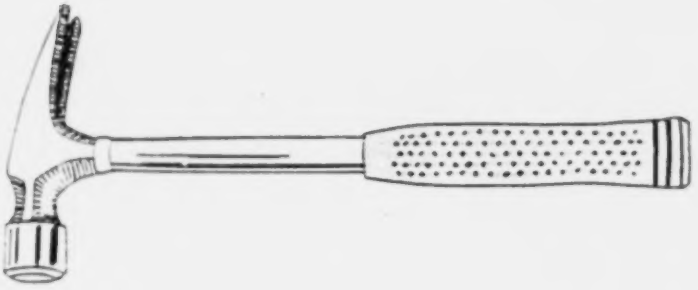
Given a picture, choose the appropriate and safe use of selected carpentry tools.

_____ 1. The figure below is



a. straight hammer
b. curved-claw hammer
c. framing hammer
d. sledge hammer

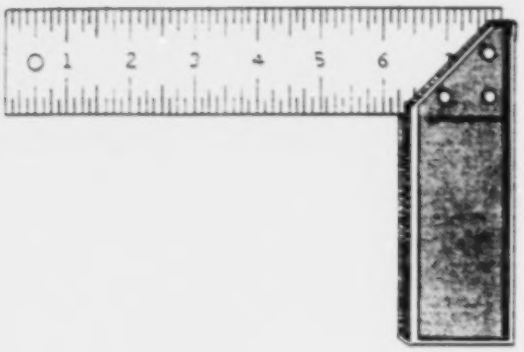
_____ 2. The hammer shown below weighs 24 ounces and is called a/an



a. straight-head hammer
b. curved-claw hammer
c. carpenter's hammer
d. framing hammer

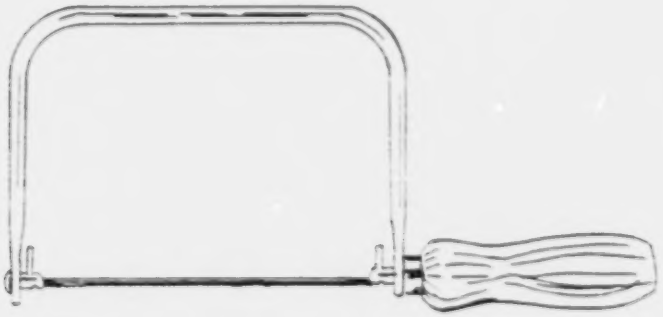
May be photocopied for student use

_____ 3. The most appropriate use for the tool shown below is to



a. measure and check 45- and 90-degree angles
b. measure lumber over 8 feet in length
c. check dimensions on a blueprint
d. measure using metric numbers

_____ 4. The tool shown below is a _____ saw and is used to



a. coping, cut curves
b. hack, cut metal
c. dovetail, cut joints
d. coping, cut square ends

May be photocopied for student use

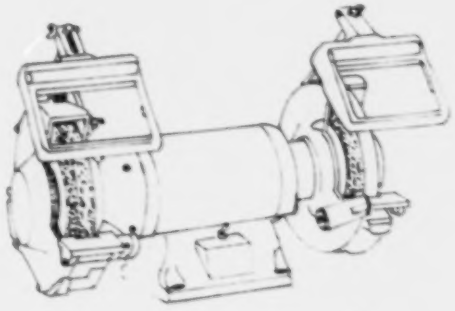
_____ 5. The tool below represents a

a. locking C-clamp
b. spring clamp
c. C-clamp
d. hand-screw clamp

OBJECTIVE 4

Choose the word or phrase to complete statements about the appropriate and safe use of power tools. Write the correct answer in the blank.

_____ 1. The following power tool requires the use of

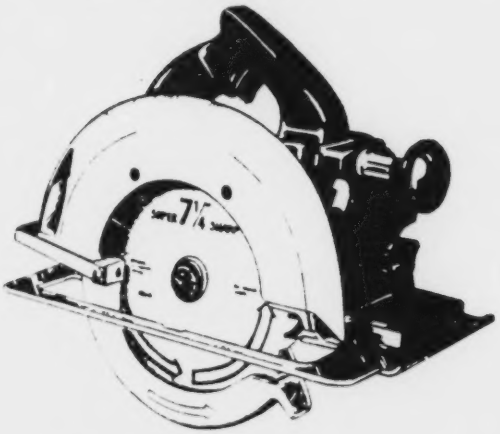


a. hard-toed shoes
b. safety shields or goggles
c. gloves
d. all of the above

May be photocopied for student use.

_____ 2. To operate this tool safely requires that the operator

a. keep hands clear of the blade
b. wear safety goggles
c. check lumber or stock for nails
d. all of the above



_____ 3. A powder-actuated tool

a. is used for installing insulation
b. is used for applying sheathing
c. requires steel-toe shoes for safety
d. requires certification for operation

_____ 4. Before starting the cut with a circular saw, check the condition of the blade and be sure it is secure, check the stock for nails, and

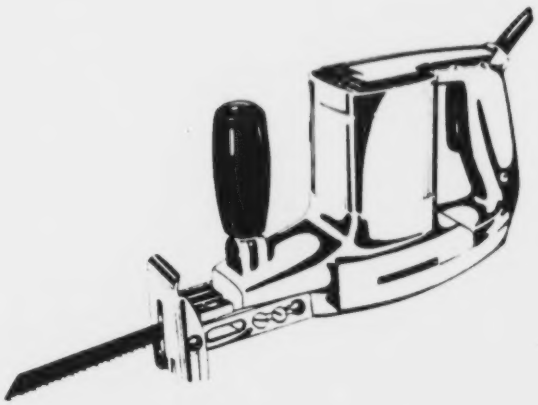
a. set the blade against the stock
b. be sure the saw is running at maximum speed
c. put on your gloves
d. pull back the blade guard

_____ 5. Grinders may be used for all of the following materials EXCEPT

a. aluminum
b. steel
c. wood and plastic
d. concrete and masonry

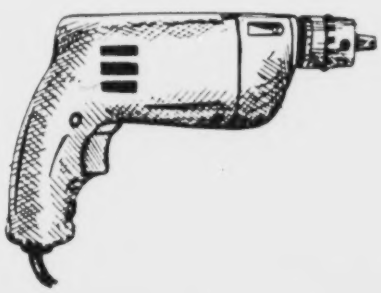
May be photocopied for student use

_____ 6. The tool below is used for making cross, inside curve, corner, _____ cuts.



a. relief, irregular, and pocket
b. relief, straight, and bevel
c. ripping, pocket, and relief
d. reciprocal, miter, and relief

_____ 7. This tool is used for all of the following EXCEPT



a. cutting holes with hole saw
b. mixing materials
c. boring and drilling
d. making pocket cuts

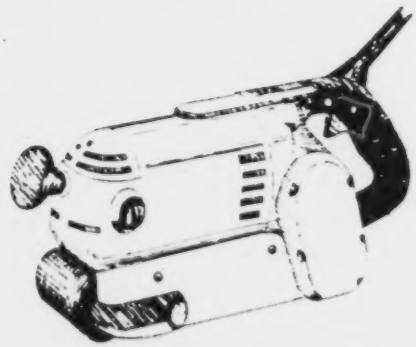
May be photocopied for student use.

_____ 8. To remove rust and scale from steel and for wire brushing, use the

a. bench grinder
b. angle grinder
c. drill
d. belt sander

_____ 9. When using the tool below, the operator must wear

a. safety goggles
b. gloves
c. breathing mask
d. all of the above



_____ 10. With pneumatic nailers and staplers, you should always assume that

a. the fastener is not safe
b. gloves will protect your hands
c. the fasteners are loaded
d. all of the above

NOTE: Objectives 4-12 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use

WRITTEN TEST ANSWERS	CARPENTRY TOOLS	A 2

OBJECTIVE 1

1. d	6. c	11. d
2. b	7. d	12. a
3. a	8. b	13. c
4. a	9. c	14. d
5. c	10. a	15. c

OBJECTIVE 2

1. c	6. b	11. d
2. a	7. a	12. c
3. d	8. a	13. a
4. b	9. b	14. c
5. d	10. d	15. d

OBJECTIVE 3

1. b	4. a
2. d	5. c
3. a	

OBJECTIVE 4

1. b	6. d
2. d	7. d
3. d	8. b
4. b	9. a
5. c	10. c

OBJECTIVE SHEET	APPLIED SKILLS	A 3

INTRODUCTION

This unit describes important terms and practices in the layout and completion of basic building projects. In carpentry, the term layout is used to describe two carpentry tasks:

1. Site layout — establishing points at a building site
2. Marking material to indicate the placement of other building members or for cutting material

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

After completing this unit, the student should be able to lay out and construct basic carpentry projects. The student will demonstrate these competencies by completing the assignment sheet, job sheets, and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to show the ability to:

1. Given a list of terms associated with layout, match them to their correct definitions.
2. Provided with a list of alternatives, distinguish between practices that contribute to inaccurate layout.
3. Provided a drawing, identify the parts of a footing form.
4. Provided a drawing, identify the framing members in a wall, partition, and ceiling.
5. Compute the size of framing members and rough openings. (Assignment Sheet 1)
6. Using a numbered drawing, identify the major elements of an interior door and door frame.

7. Lay out and construct forms for a continuous footing. (Job Sheet 1)

8. Lay out and construct a wall section for a structure:

   a. Lay out wall section location on floor. (Job Sheet 2)

   b. Cut studs, trimmers, and header to dimensions. (Job Sheet 3)

   c. Assemble corners and header. (Job Sheet 4)

   d. Complete and raise wall section. (Job Sheet 5)

SUGGESTED ACTIVITIES	APPLIED SKILLS	A 3

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials to supplement unit.
- Give an overview of the course, explaining the organization of the materials from the foundation to the finished house.
- Introduce unit.

DELIVERY

Objective 1: Given a list of terms associated with layout, match them to their correct definitions.

- Use Information Sheet to discuss terms and definitions associated with layout.
- Use TM 1 to discuss terms dealing with site layout.

Objective 2: Choose the word or phrase to complete statements about squaring methods.

- Discuss and demonstrate the 3-4-5, diagonal, and transit methods.
- Provide students opportunities to practice each method and to observe one another using the various methods.
- Review and discuss the errors listed in this section.
- Have students try to come up with other ways errors may be made.
- Demonstrate and explain how slack in a tape will make layout inaccurate.
- Demonstrate to students how tapes, rules, and squares are not properly aligned.

- Explain how easy it is to miss placing end of tape or rule on the correct reference point and how easy it is to read or record incorrect numbers.

- Explain that doing layout with a dull point on a pencil may cause an error of an inch or more if the walls are long.

- Demonstrate that if the framing square is not tight against workpiece, that the marks may be crooked and thus off throughout the layout work.

- Again caution students to use tools properly and accurately.

Objective 3: Provided a drawing, identify the parts of a footing form.

- Use TM 2 and information sheets to identify parts of a footing form.

Objective 4: Provided a drawing, identify the framing members in a wall, partition, and ceiling.

- Use TMs 3-5 to discuss framing members.

Objective 5: Compute the size of framing members and rough openings. (Assignment Sheet 1)

- Describe methods for computing the size of framing members and rough openings.

- Assign students to complete Assignment Sheet 1.

Objective 6: Using a numbered drawing, identify the major elements of an interior door and door frame.

- Use TM 6 and information sheets to identify the elements of an interior door and frame.

APPLICATION

Objective 7: Lay out and construct forms for a continuous footing. (Job Sheet 1)

- Assign students to complete Job Sheet 1.

Objective 8: **Lay out and construct a wall section for a structure:**

a. **Lay out wall section location on floor.** (Job Sheet 2)

b. **Cut studs, trimmers, and header to dimensions.** (Job Sheet 3)

c. **Assemble corners and header.** (Job Sheet 4)

d. **Complete and raise wall section.** (Job Sheet 5)

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements from pretest results.
- Counsel students individually on pretest results and study requirements.
- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.
- Evaluate students on job sheet activities.
- Complete appropriate section of competency profiles.
- Reteach and reevaluate if necessary.
- Complete the appropriate section of the competency profiles.
- Review individual and group performance in order to evaluate teaching methods.
- Adjust the scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

AGC Videos

- *Form Carpentry*. AGC of America, 1957 E. Street N.W., Washington, D.C. 20006
- *Frame Carpentry*. AGC of America, 1957 E. Street N.W., Washington, D.C. 20006
- *Ladder Safety*. AGC of America, 1957 E. Street N.W., Washington, D.C. 20006

UNIT REFERENCES

- *Molding Chart*. Southwest Molding Company, 3950 LaReunion Parkway, Dallas, TX 75212.
- *Residential Concrete*. Portland Cement Association, 5420 Old Orchard Road, Skokie, IL 60077-4321. 312-966-6200, ext. 450.
- Toenjes, Leonard P. *Building Trades Dictionary*. American Technical Publishers, Inc., Homewood, IL, 1989.
- United States Department of the Interior, Bureau of Reclamation. *Concrete Manual: A Water Resources Technical Publication*, 7th ed., Washington, D.C.: U.S. Government Printing Office.
- Wagner, Willis. *Modern Carpentry*. Goodheart-Willcox Co., Inc.: South Holland, IL.
- Willey, Al. *Residential Carpentry*. Oklahoma Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and The Associated General Contractors of America: Stillwater, OK., 1993.

INFORMATION SHEET	APPLIED SKILLS	A 3

OBJECTIVE 1

Given a list of terms associated with layout, match them to their correct definitions.

INTRODUCTION

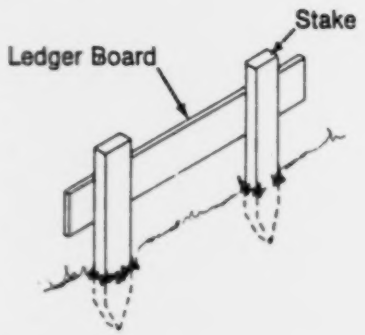
Carpenters use the term "layout" to describe (1) site layout — establishing points at a building site, (2) the marking of material to indicate the placement of other building members or where to cut material.

Site layout terms

- **batter board** — temporary framework on which to stretch a line to assist in locating corners and building lines when laying out a building (Figures 1 and 2)

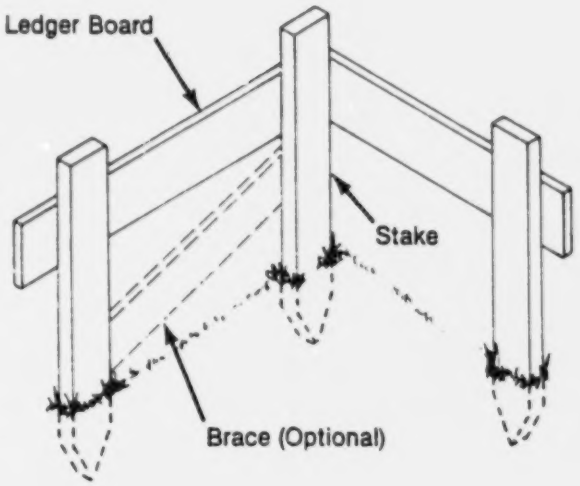
  — **Straight batter board**

FIGURE 1



— **Right angle batter board**

FIGURE 2



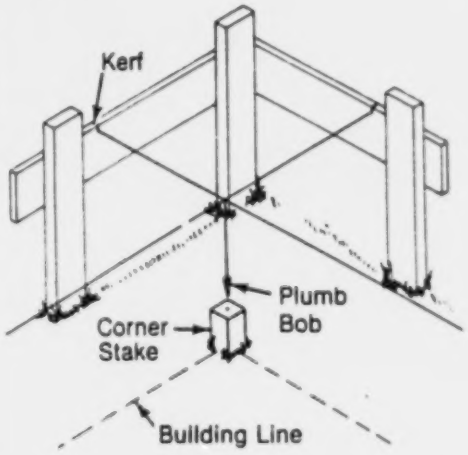
- **elevation** — given grade
- **excavating** — removing soil for footing or for establishing a uniform grade
- **fall** — slope of a line, expressed as inches of fall per foot of run

  EXAMPLE: 1 inch fall per 1 foot of run
- **fill** — soil or other substance used to raise grade
- **finish-floor grade** — elevation of finished floor in relation to bench mark
- **grade line** — proposed or future level of ground around structure
- **grade stake** — stake driven into ground, usually with top establishing finished level of ground or concrete at that point

  NOTE: Grade for the stake is read from the bench mark.

- **height of instrument (HI)** — vertical distance from bench mark to line of sight of instrument
- **kerf** — slight indentation made with a saw; used to hold line in place

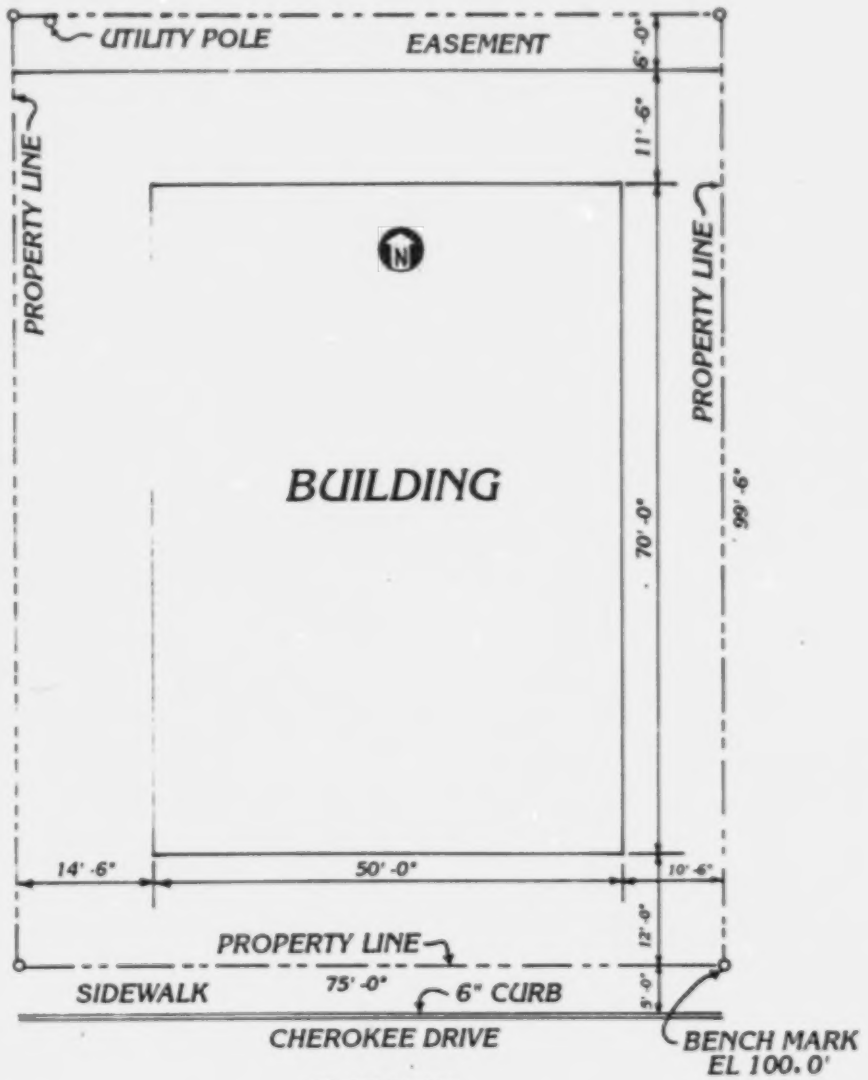
FIGURE 3



- **ledger board** — top horizontal board on batter board framework (Figure 2)
- **leveling rod** — rod used with builder's level; graduated in tenths and hundredths of a foot or in inches and feet

- **plot plan** — drawing used to show location and size of structure(s), driveways, sidewalks, patios, property lines, utilities, and existing conditions

FIGURE 4



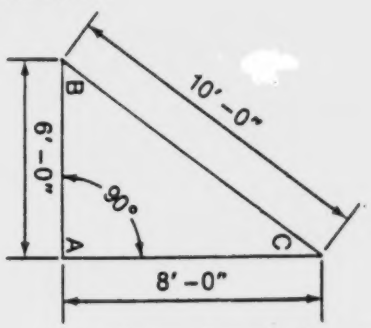
PLOT PLAN

- **plumb bob** — tool or device attached to a string; used to set or check plumb or perpendicular of a surface (see Figure 3)
- **property lines** — boundaries of a lot or plot of ground (see Figure 4)
- **setback line** — line established by law, fixing the exterior face of structure a minimum distance from right-of-way or property line
- **squaring methods** — used to ensure building lines, foundations, and/or structures are square; there are three commonly-used squaring method used within carpentry
  - **3-4-5 method** — Form a right triangle using the largest multiple of 3-4-5 possible for length of lines being squared, and ensuring that longest side of the triangle is the exact appropriate multiple of 5

    NOTE: Any multiple of 3-4-5 may be used [i.e., 6-8-10, 12-16-20, 24-32-40] depending on the size being checked.

    EXAMPLE: Using 3-4-5 rule to square building lines 6′-0″ × 8′-0″, line BC will measure exactly 10 feet if lines AB and AC are square (Figure 5)

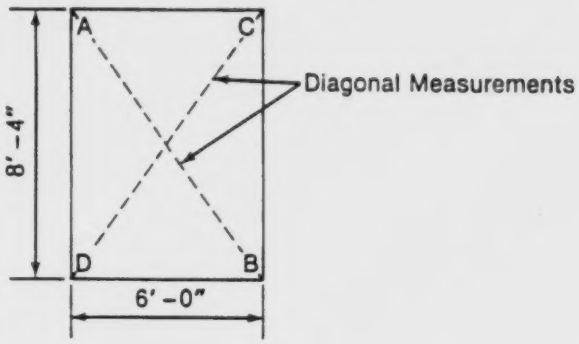
FIGURE 5



  - **diagonal method** — measure diagonally from inside corners of layout and ensuring that diagonal lines are equal in length

EXAMPLE: Using the diagonal method to square building lines 6'-0" × 8'-4", lines AB and CD will be exactly the same measurement if building corners are square and if dimensions on opposite sides are exactly the same as each other (Figure 6)

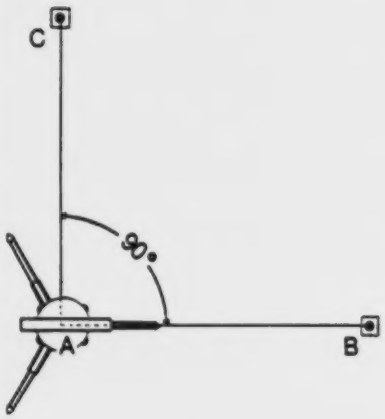
FIGURE 6



— **transit method** — set the instrument exactly at the point where right angle is to be, sight a reference point on one line of the angle, set 360-degree scale at zero, and establish the second line of angle where scale indicates a 90-degree arc has been completed

EXAMPLE: Using instrument to square corners of building lines, when instrument is at point A and sighted on a point on line AB, 360-degree scale will indicate that an arc of 90 degrees has been completed at line AC (Figure 7)

FIGURE 7



- **surveying** — process of measuring land by recording elevations and noting directions and lengths of property lines and sizes of structures

Terms used when marking materials

The following terms are used for the marking of material to indicate the placement of other building members or for cutting material.

- **chalk box** — small box filled with string line and colored powder used to mark a line
- **framing square** — "L" shaped layout tool to mark 90° angles
- **layout marks** — marks used in layout to indicate the placement of framing members

  R — rafter

  X — joist or stud

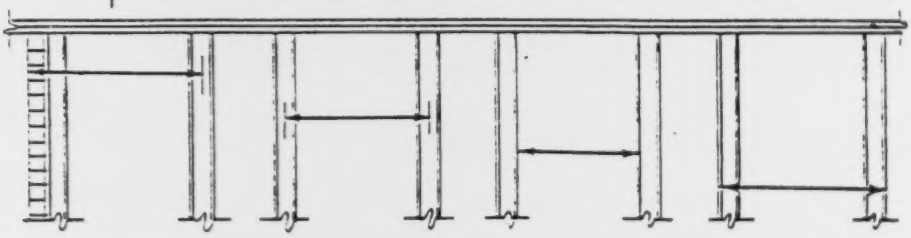
  T — trimmer

  C — cripple stud

  R.O. — rough opening

- **levels** — tool used to assure the horizontal or vertical position of an object
- **on-center (o.c.)** — one of several terms used to indicate measurement points; below are examples given for the measurement of framing members.

FIGURE 8



Outside to Center **on-center (o.c.)** Wall to Wall Outside to Outside

- **rough opening (ro)** — an opening in a wall to receive a component such as a window or door
- **speed square** — a smaller triangle shaped layout tool often used to mark lumber for cutting

Other terms

- **blocking** – piece of wood fastened between structural members to provide structural support or strengthen a joint
- **cleat** – small board used to join formwork members
- **crown** – slight convex deformation in a board on the load-bearing edge
- **dowel** – wood or metal cylinder inserted into holes in adjoining members to align and strengthen the joint
- **keyway** – small piece of wood placed at the top of a form to create a small indentation in the concrete that keeps adjoining concrete structures from moving sideways

OBJECTIVE 2

Provided with a list of alternatives, distinguish factors that contribute to inaccurate layout.

- Leaving slack in tape
- Not aligning tape, rule, or square properly
- Not placing end of tape or rule on reference point
- Reading and recording incorrect numbers
- Using a dull pencil
- Not keeping square tight against workpiece
- Using the square backwards when layout of studs, joists, or rafters

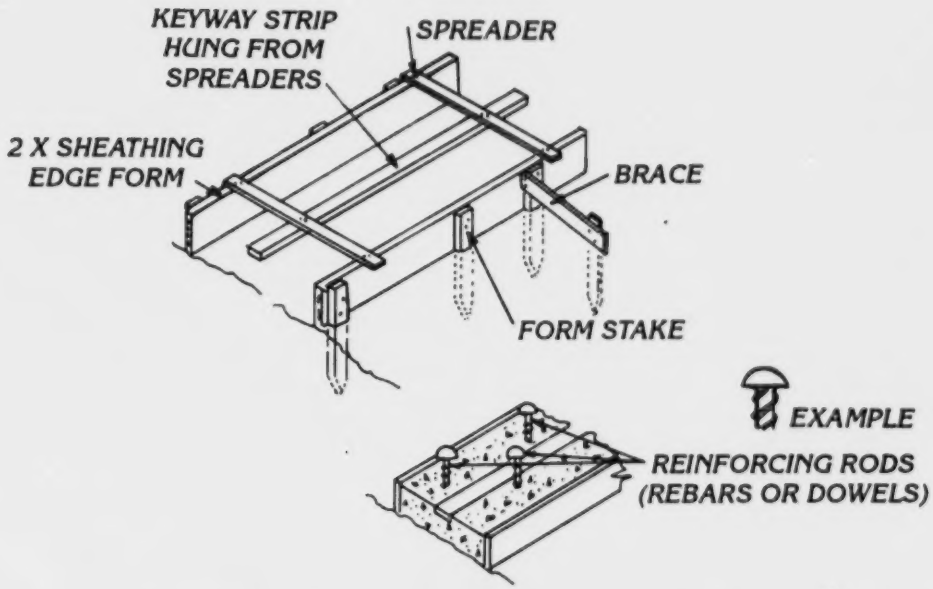
OBJECTIVE 3 | **Provided a drawing, identify the parts of a footing form.**

INTRODUCTION | This section is intended to assist you in preparation of completing job sheet one.

There are many types of forms used to shape and hold concrete. One type, the footing form (Figure 9), is used to pour a wide concrete base on which the foundation walls, columns, or piers are to be placed.

- **footing form**

FIGURE 9

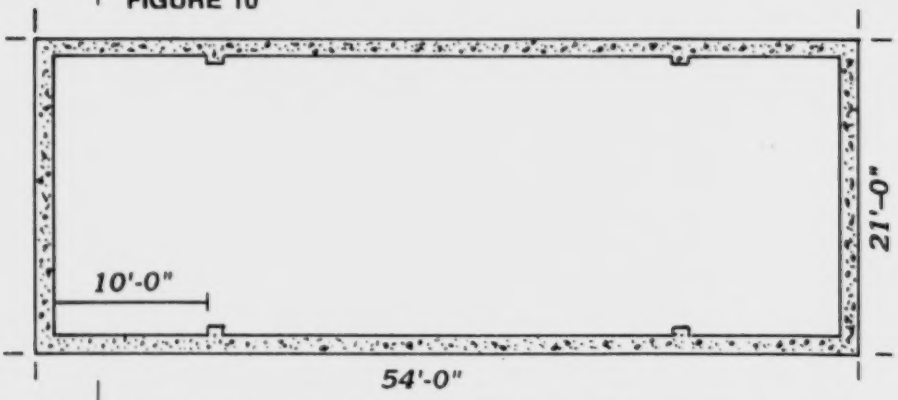


CAUTION: REBAR caps must be placed over any protruding REBAR or an injury can occur.

- **continuous footing**

  Footing forms can be used to pour a continuous footing (Figure 10).

FIGURE 10



OBJECTIVE 4

Provided a drawing, identify the framing members in a wall, partition, and ceiling.

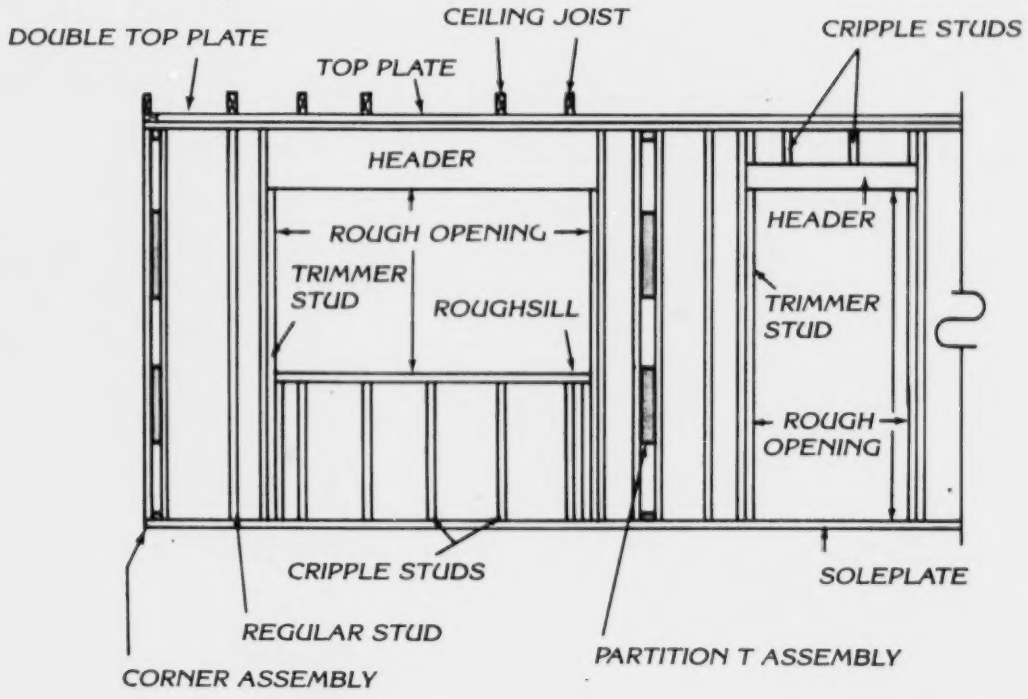
INTRODUCTION

This section will assist you in preparing to lay out and construct a wall in Job Sheets 2-6.

Framing members can be made of wood or metal. Wood framing is economical, but metal framing is gaining popularity for its durability and strength.

- **framing members**

FIGURE 11

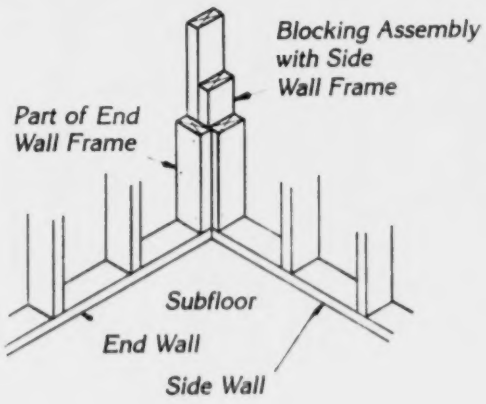


- **Corner assemblies**

  The methods shown are some of the possible methods; many others exist. The important considerations are solid corner and nailing surfaces for the interior and exterior wall finishes. Most carpenters try to choose the straightest, least defective studs for corner assemblies.

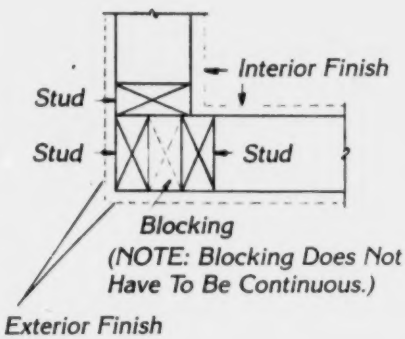
— **constructed with three full 2×4 studs and blocking**

FIGURE 12



— **constructed with three full 2×6 studs and blocking**

FIGURE 13

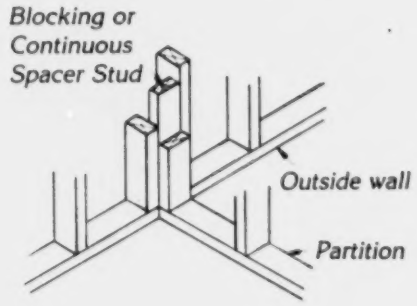


- **Partition Ts**

  Several methods for tying in partition walls exist. Some of the more common are illustrated here.

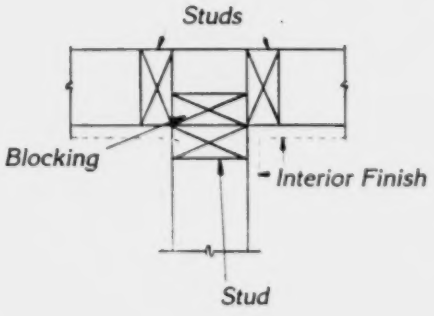
  — **constructed with three 2×4 studs and blocking**

FIGURE 14



  — **constructed with three 2×6 studs and blocking**

FIGURE 15



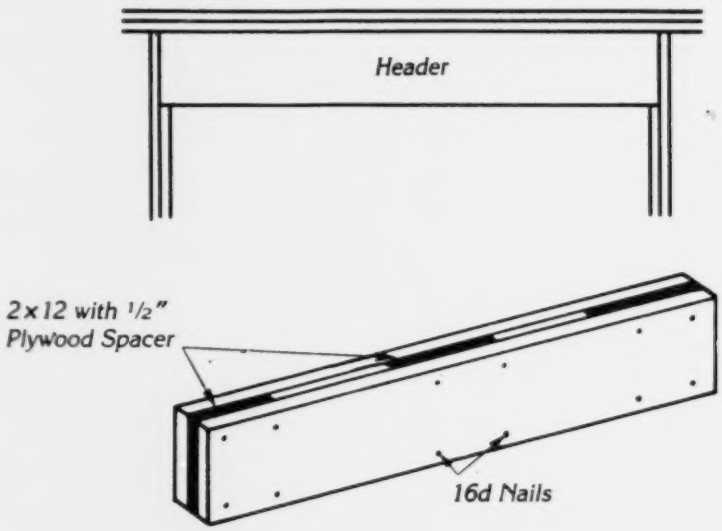
- **Headers**

  There are many different types of headers. A solid or full header is the most common and illustrated here.

— **solid or full header**

A full header is used for large openings and fills the area from the rough opening to the bottom of the top plate

FIGURE 16



- **Studs**

  Studs are the wood or metal vertical framing members in a wall. They are usually made of 2× material such as 2×4s or 2×6s.

- **Rough opening**

  Rough openings provide space to install components such as windows and doors into wall framing.

- **Trimmers**

  Trimmers are used to strengthen the frame around a rough opening for a window or door.

- **Joists**

  Joists are horizontal support members used to attach flooring and ceiling material.

OBJECTIVE 5

Compute the size of framing members and rough openings. (Assignment Sheet 1)

INTRODUCTION

Some characteristics of framing members are specified in the building plans. Others must be calculated by the carpenter while on the job. Calculations differ depending on the type of flooring specified and the dimensions of the framing material.

The following examples assume use of a wooden floor and 2× framing members.

- Calculating stud length

  Use the example shown in Figure 17 to calculate the stud length.

  1. Determine the height of the finished ceiling from the finished floor including ½-inch clearance for finish material.

     = 8′½″

  2. Determine the thickness of the sole plate plus the double top plate.

     1½″ + 3″ = 4½″

  3. Determine the thickness of ceiling material and underpayment.

     ½″ + ⅝″ = 1⅛″

  4. Add the thickness of ceiling and underpayment to the finished ceiling height.

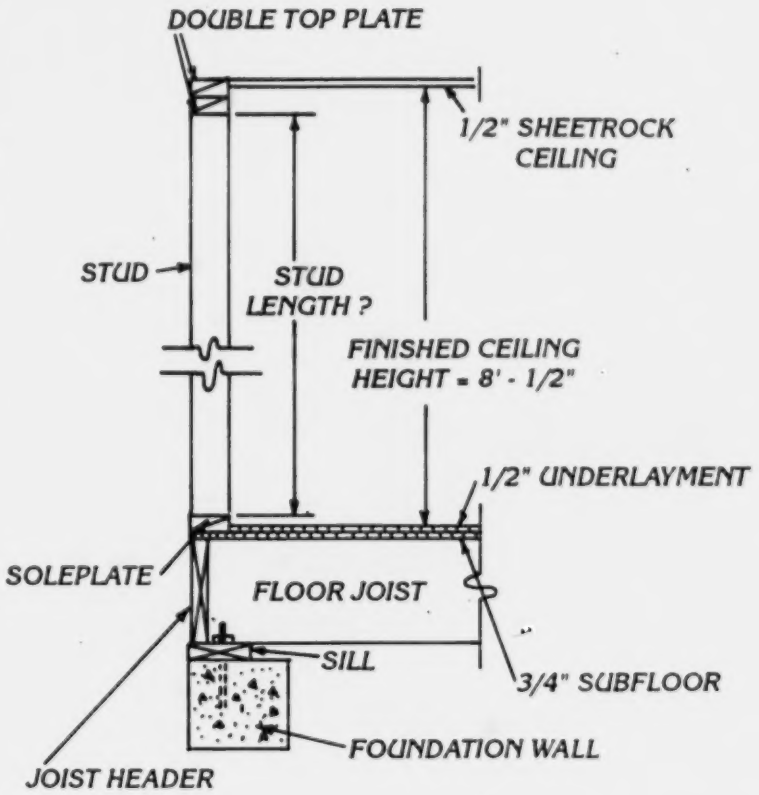
     8′½″ + 1⅛″ = 8′ 1⅝″

5. Subtract the thickness of the plates from the sum achieved in step 4 for the stud length.

   8′ 1⅛″ − 4½″ = 7′ 9⅛″

   EXAMPLE: The desired finished ceiling height is 8′-½″, the actual plate thickness is 1½ inches, the ceiling thickness is ½ inch, and the underpayment thickness if ⅛ inch. (See Figure 17.)

FIGURE 17



OBJECTIVE 5

Compute the size of framing members and rough openings. (Assignment Sheet 1)

INTRODUCTION

Some characteristics of framing members are specified in the building plans. Others must be calculated by the carpenter while on the job. Calculations differ depending on the type of flooring specified and the dimensions of the framing material.

The following examples assume use of a wooden floor and 2× framing members.

- Calculating stud length

  Use the example shown in Figure 17 to calculate the stud length.

- Calculating the length of headers.

  1. Rough header length for doors.

     NOTE: If prehung doors are used, check manufacturer's specifications for rough opening size.

     a. Check door schedule for door size.

     b. Determine rough opening width.

     c. Add 1¼" for side jambs.

     d. Add 1" for clearance to install jambs.

     e. Add 3" to rough opening width for trimmer studs.

     EXAMPLE: For a 3'-0" × 6'-8" door

Door width	3'-0"
Side jambs	1¼"
Side jambs and trimmer clearance	+ 1"
Rough opening	3'-2¼"
Thickness of trimmer studs	+ 3"
Header size	3'-5¼" or 41¼"

- Calculating trimmer stud length for door opening

  1. Determine the height of the rough opening from the floor by performing the steps below.

     a. Determine door height and add ⅛" for door/header clearance.

        6'-8" + ⅛" = 6'-8⅛"

        NOTE: Standard doors are 6'-8" high.

     b. Add ⅝ inch for clearance at bottom of door.

        6'-8⅛" + ⅝" = 6'-8⅞"

  2. Add ⅝ inch for jamb header.

     6'-8⅞" + ⅝" = 6'-9⅜"

  3. Add ¾ inch for clearance between rough header and jamb header.

     6'-9⅜" + ⅝" = 6'-10⅛"

  4. Subtract thickness of the sole plate and add thickness of underlayment.

     6'-10⅛" – 1½" + ½" = 6'-9⅛"

     EXAMPLE: For a 3'-0" × 6'-8" door

Door height	6'-8"
Door and header clearance	⅛"
Bottom clearance	⅝"
Jamb header	⅝"
Jamb header and rough header clearance	+ ¾"
Actual rough opening height	6'-10⅛"
Sole plate/underlayment	– 1"
Trimmer stud length	6'-9⅛"

- Calculating rough openings for doors

  1. Width

     a. Check door schedule for door size.

     b. Add ¼ inch to door width for clearance between door and side jambs.

     c. Add 1¼ inches (⅝ inch each) for side jambs.

     d. Add ¾ inch (⅜ inch each) for clearance between jamb and trimmer stud.

     e. Round to the next larger half inch to obtain the actual rough opening width.

        EXAMPLE: For a 3′-0″ × 7′-0″ door

Door width	3′-0″
Door and jamb clearance	¼″
Side jambs	1¼″
Side jamb and trimmer clearance	+ ¾″
Actual rough opening width	3′-2¼″

  2. Height

     a. Check door schedule for door size.

     b. Add ⅛ inch to door height for clearance between door and header jamb.

     c. Add ⅝ inch for header jamb.

     d. Add ⅝ inch for clearance under door.

     e. Add ¾ inch for header jamb and rough header clearance.

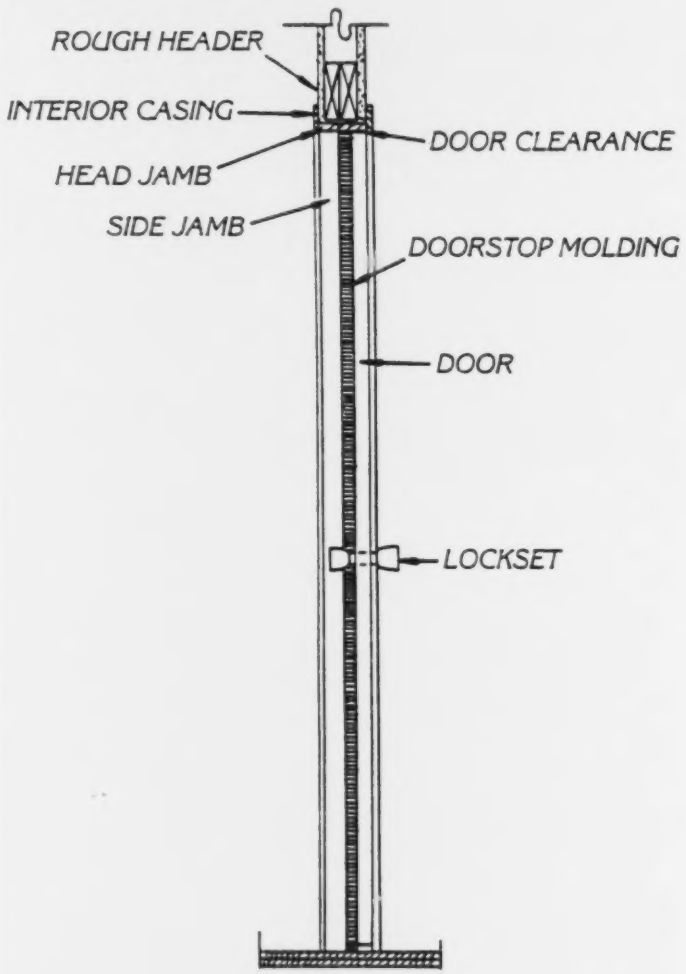
EXAMPLE: For a 3′-0″ × 7′-0″ door

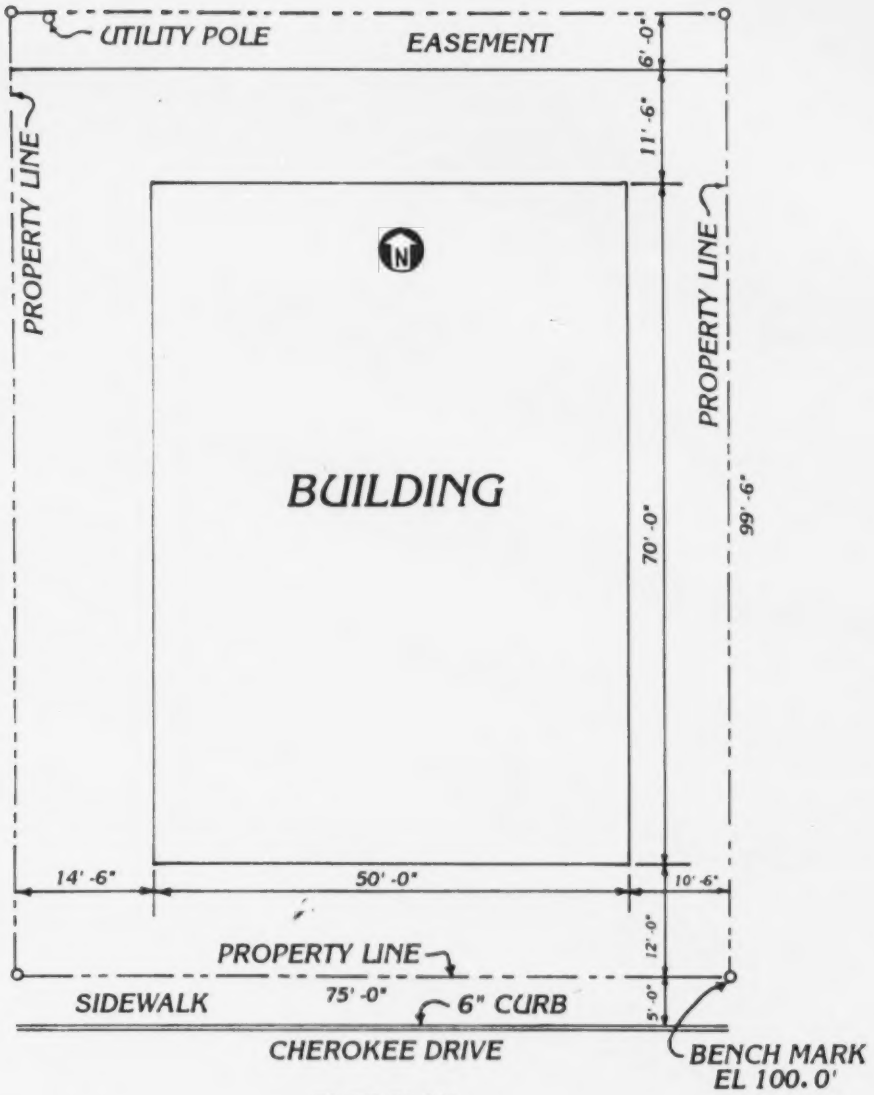
Door height	7′-0″
Door and header clearance	1/8″
Jamb header	5/8″
Bottom clearance	5/8″
Jamb header and rough header clearance	+ 3/4″
Actual rough opening height	7′-2 1/8″

OBJECTIVE 6

Using a numbered drawing, identify the major elements of an interior door and door frame.

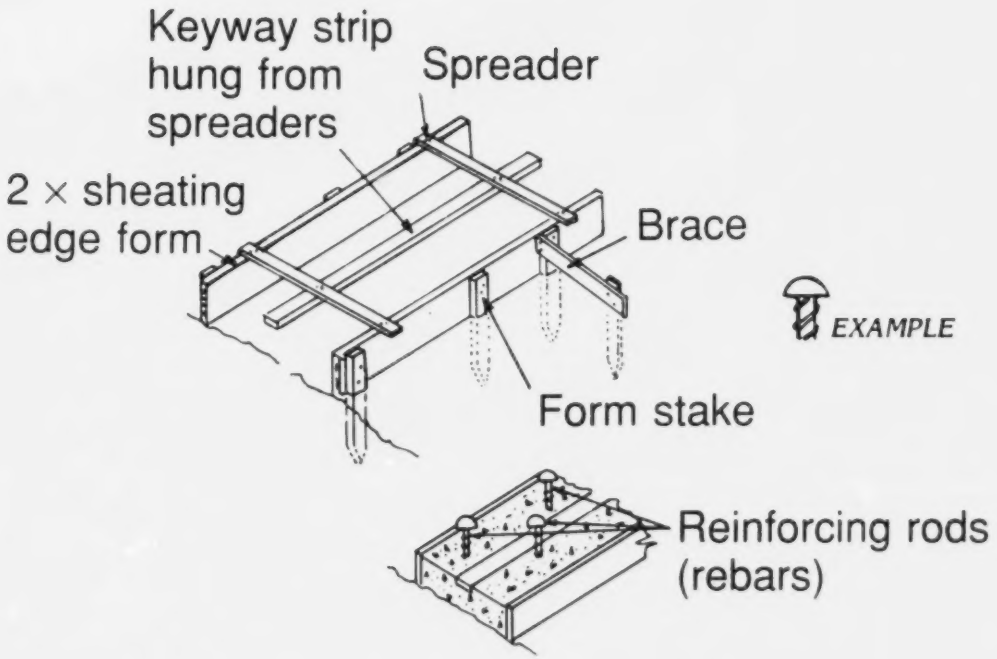
FIGURE 18



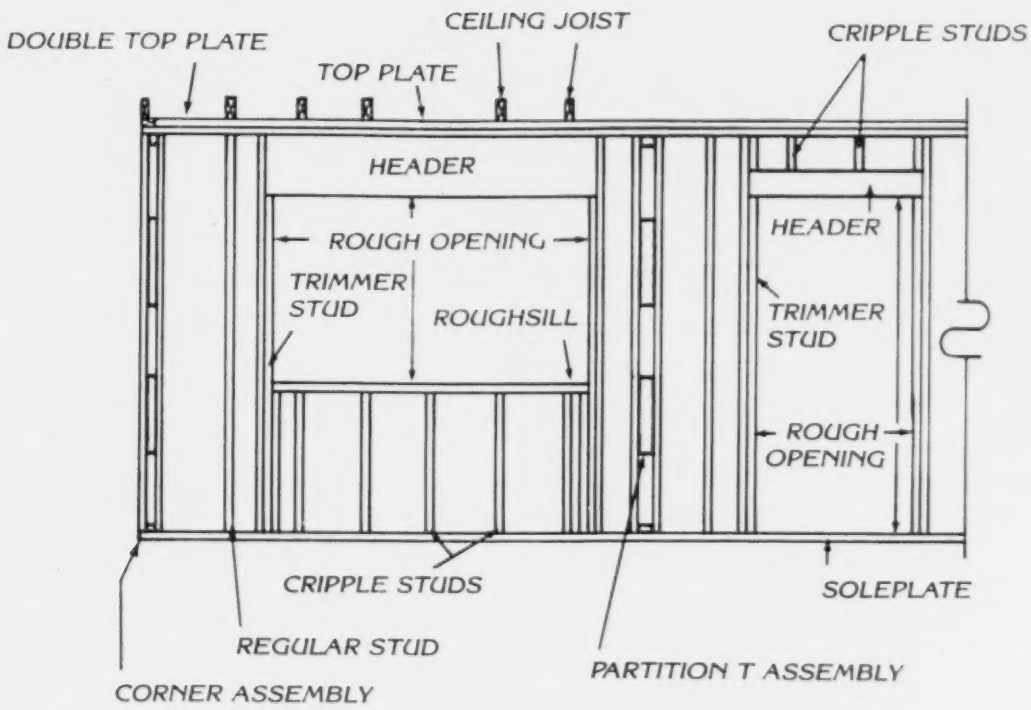

UTILITY POLE
EASEMENT
6'-0"
11'-6"
PROPERTY LINE
PROPERTY LINE
N
BUILDING
70'-0"
99'-6"
14'-6"
50'-0"
10'-6"
12'-0"
PROPERTY LINE
SIDEWALK
75'-0"
6" CURB
5'-0"
CHEROKEE DRIVE
BENCH MARK
EL 100.0'

PLOT PLAN

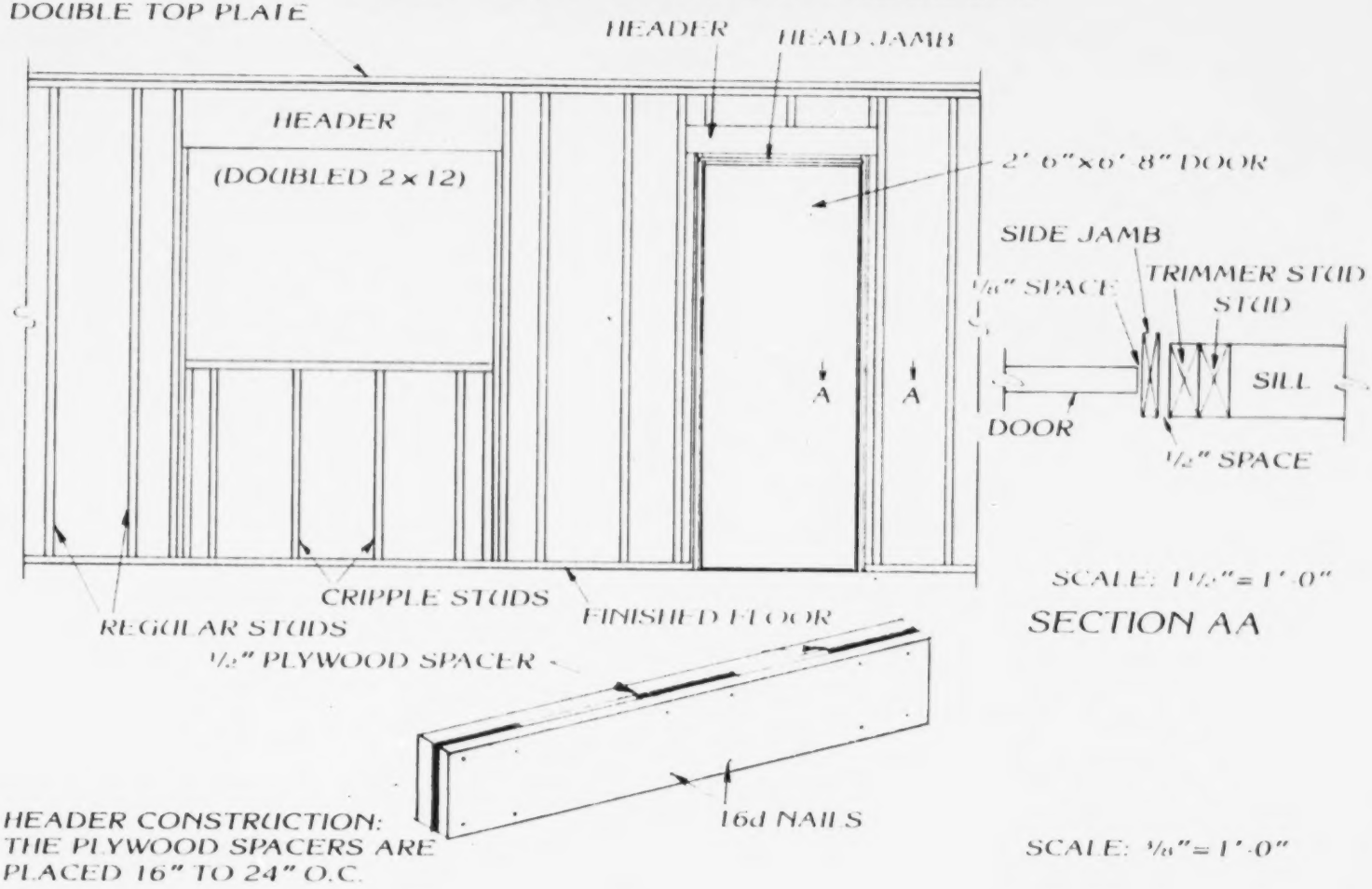
Parts of a Footing Form



Wall and Partition Framing Members



Door and Window Headers



SCALE: 1½" = 1'-0"

SECTION AA

HEADER CONSTRUCTION:
THE PLYWOOD SPACERS ARE
PLACED 16" TO 24" O.C.

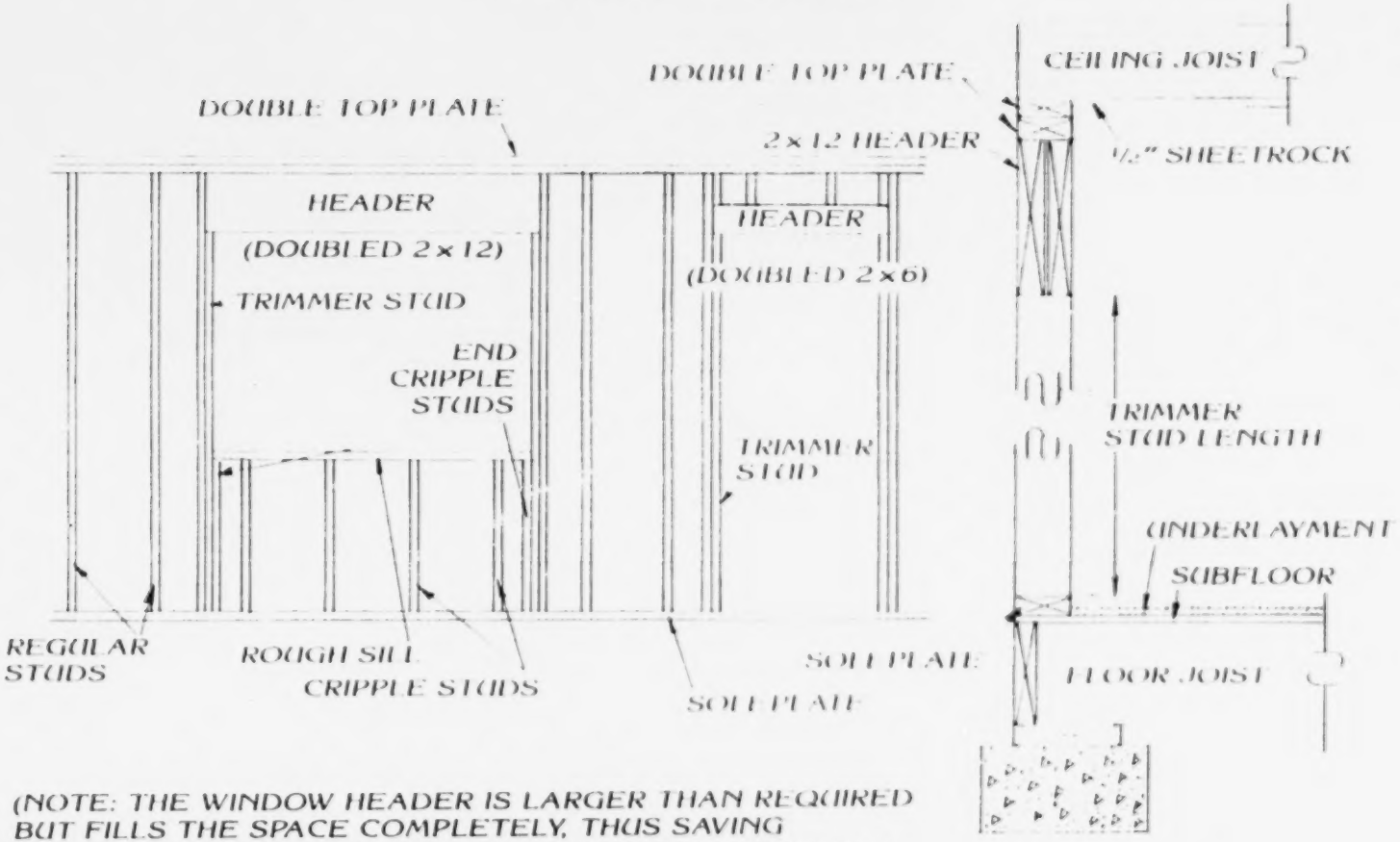
SCALE: ⅛" = 1'-0"

TRANSPARENCY MASTER 4 - Introduction to Carpentry
CIMC A 3 - 35

Wiech

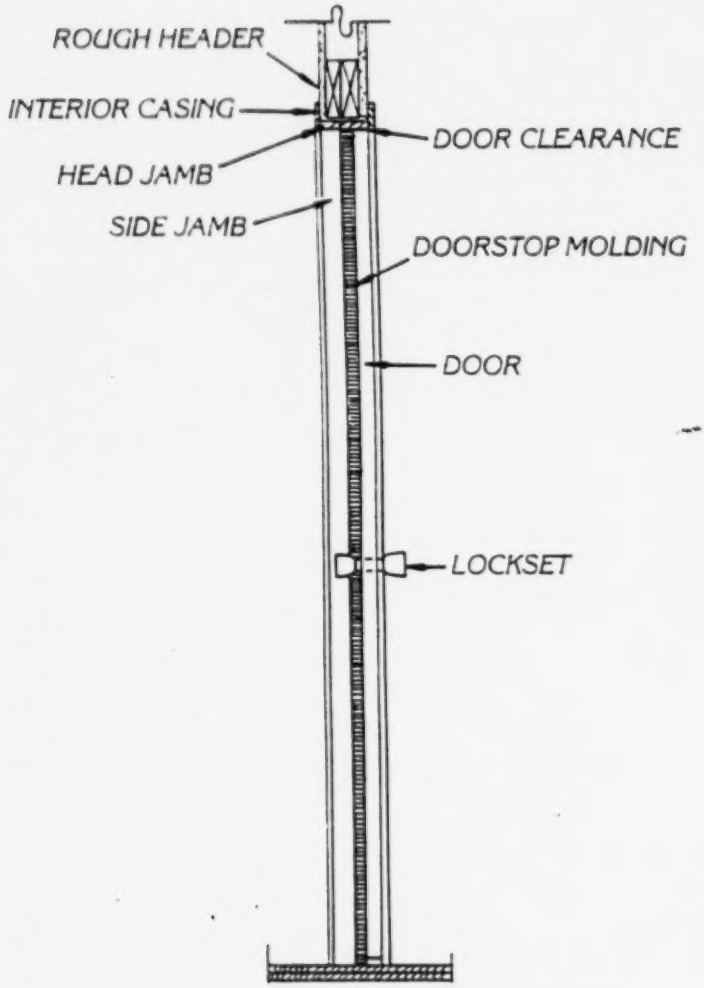
TM 4

Trimmer Studs

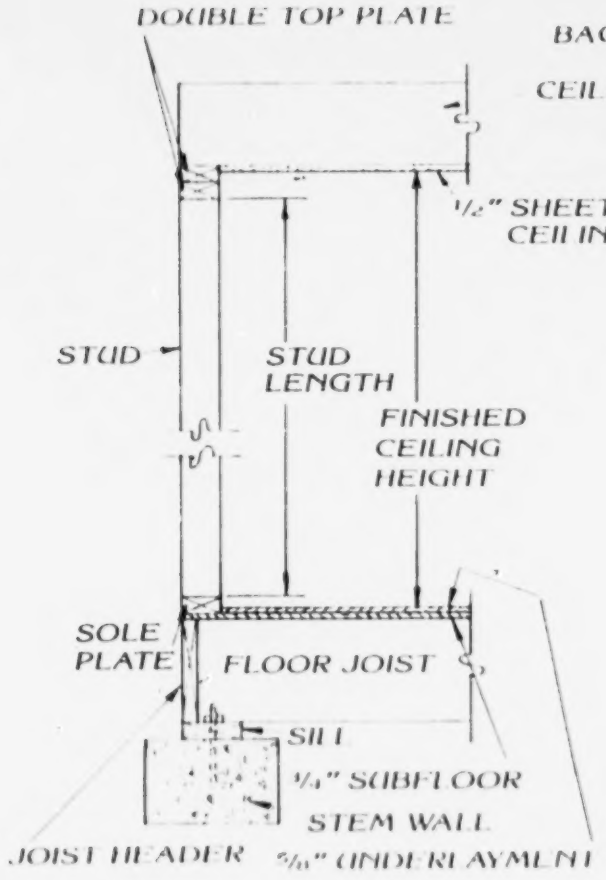


(NOTE: THE WINDOW HEADER IS LARGER THAN REQUIRED BUT FILLS THE SPACE COMPLETELY, THUS SAVING LABOR IN CUTTING AND ASSEMBLING SHORT CRIPPLES.)

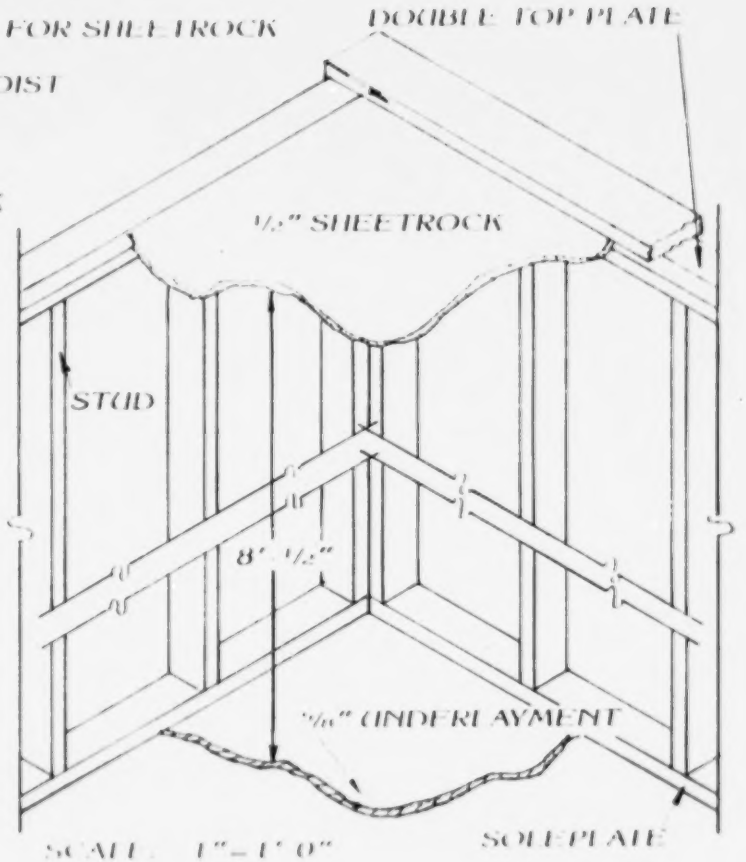
Parts of a Door Unit



Stud Length for a Wood Floor



244



245

ASSIGNMENT SHEET 1	APPLIED SKILLS	A 3

Name _____ Score _____

OBJECTIVE 5

Compute the size of framing members and rough openings.

INTRODUCTION

This exercise allows you to practice your skills in calculating the size of various framing members used in structures with wooden floors and 2× framing members.

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with fractions
- Convert whole numbers to fractions

Math Application Skills
- Use English and metric measures

Job Acquisition/ Development Skills
- Master specific job task/procedure

Part A — Calculating stud length

DIRECTIONS

Given variables, calculate the stud length for the following finished ceiling heights.

- Ceiling finish material = ½″
- Sole plate = 1½″

- Double top plate = 3″
- Underlayment = ¾″

1. A finished ceiling height of 8′-6″.

   Stud length = _____

2. A finished ceiling height of 10′-½″.

   Stud length = _____

3. A finished ceiling height of 7′-½″.

   Stud length = _____

Part B — Calculating headers length

DIRECTIONS Given variables, calculate the length of headers for doors.

1. With a door width of 2′-8″, what should the header length be?

   _____

2. For a door width of 3′-0″, what length should the header be?

   _____

Part C — Calculating trimmer stud length

DIRECTIONS Given variables, calculate the length of the trimmer studs.

- Sole plate = 1½″
- Underpayment = ½″

1. What would be the length of the trimmer studs for a door height of 6′-8″?

   _____

2. Calculate the trimmer stud length for a door height of 8′-0″.

_____

Part D — Calculating rough openings for door

Door units and trim are generally expensive items due to the millwork involved. Additionally, the interior trim phase of construction greatly impacts on other phases of construction and must be carefully scheduled. For these reasons, delays due to incorrect material or inadequate preparation must be avoided. This assignment will help you become better at calculating rough opening sizes so that framing for door openings can be done properly and inspected when it comes times to hang the door.

DIRECTIONS

Compute actual rough opening size for the following door sizes.

1. 2′-0″ × 6′-8″
   a. Width — _____
   b. Height — _____
2. 3′-0″ × 7′-0″
   a. Width — _____
   b. Height — _____
3. 2′-8″ × 6′-8″
   a. Width — _____
   b. Height — _____

ASSIGNMENT SHEET 1

Part A

1. 8′-2¾″
2. 9′-9¼″
3. 6′-9¼″

Part B

1. 3′-1¼″
2. 3′-5¼″

Part C

1. 6′-9⅛″
2. 8′- 1⅛″

Part D

1. a. Width — 2′-2¼″
   b. Height — 6′-9⅛″
2. a. Width — 3′-2¼″
   b. Height — 7′-1⅛″
3. a. Width — 2′-10¼″
   b. Height — 6′-9⅛″

JOB SHEET 1	APPLIED SKILLS	A 3

OBJECTIVE 7

Lay out and construct forms for a continuous footing.

INTRODUCTION

Continuous footings are used to provide structural support to buildings. During this exercise, you will use plot plans and foundation plans to ensure proper placement and construction of the footing.

Your instructor may wish to scale down the size of this continuous footing or only construct a portion of the actual form. Consult your instructor to determine the size.

EQUIPMENT AND SUPPLIES

- Hardhat and goggles
- Circular saw and extension cord
- Handsaw
- Claw hammer
- Sledgehammer
- 100′ tape
- Folding rule or steel tape
- Hand level
- String line
- Builder's level
- Plumb bob
- Form stakes, 2″ × 4″ × 18″
- Form boards, 2″ × 12″ × 12′
- Corner and hub stakes, 2″ × 2″ × 1′
- Precut spreaders, 2″ × 8″ × 3′
- 1×4s for cleats
- 8d and 16d duplex nails
- Plans (from your instructor)

NOTICE: Excavation safety procedures must be observed. Common hazards include striking underground utilities, displacement of side walls, and/or slipping/tripping during access.

BEST COPY AVAILABLE

PROCEDURE

Research and Reference Skills
- Use standard references [MSDS]

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures

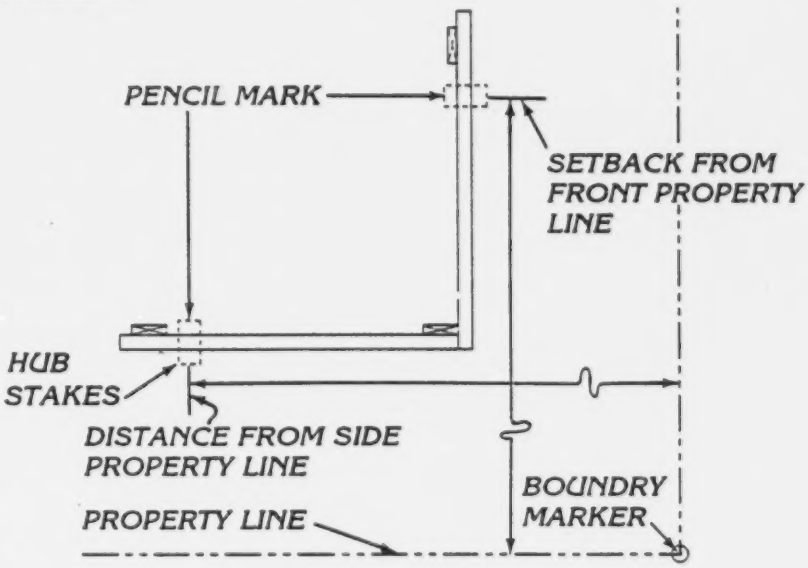
Data Analysis and Display Skills
- Interpret plans/ blueprints

Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments

	Yes	No
1. Put on safety equipment.	___	___
2. Ask your instructor to establish the building lines and footing lines.	___	___
3. Set outside forms.		
NOTE: Refer to the plans when necessary to check dimensions.		
a. Use plumb bob to locate position of footing-line stakes for each corner of building. (Figure 19)	___	___

FIGURE 19



Job Acquisition/
Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

		Yes	No
b.	Move plumb bob; drive stakes straight, leaving them a little higher than benchmark hub stakes.	___	___
c.	Re-check stakes with plumb bob after they are set.	___	___
d.	Transfer grade from grade stakes to outside footing-line stakes.	___	___
	NOTE: Your instructor will assist you in finding the grade stakes.		
e.	Attach line to stakes.	___	___
f.	String line from one line stake to one on opposite end of footing, centering line on the grade that was transferred to those stakes.	___	___
g.	Lay out forms end-to-end along the proposed footing line.	___	___
h.	Drive all outside footing stakes, spacing them approximately 4 feet apart.	___	___
i.	Nail form boards to grade, checking alignment of boards by using plumb bob attached at different points on string line.	___	___

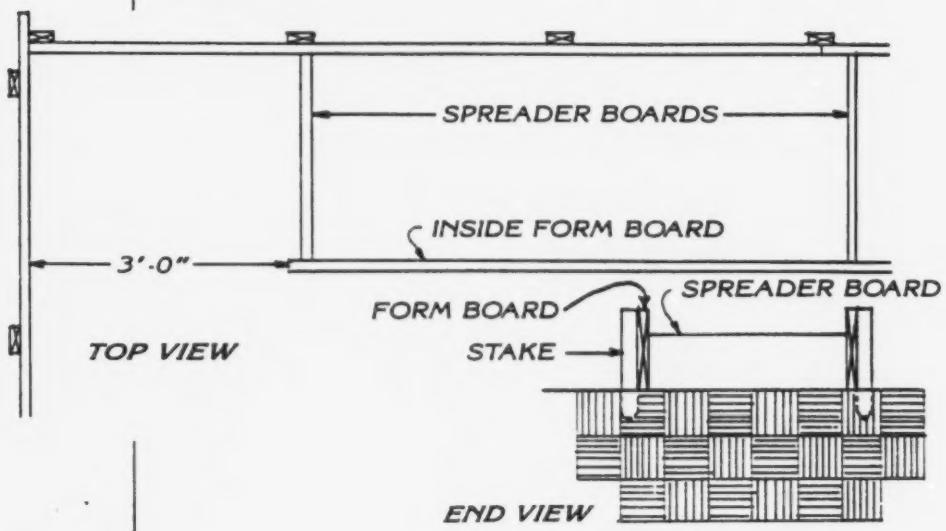
Yes No

4. Set inside forms.

   a. Set spreader boards on edge against outside forms, and then set inside form boards against spreader boards. (Figure 20) ___ ___

      NOTE: Although it is not required this training exercise, form oil must be applied either before or after installation. Be sure to use protective equipment as specified in the product's MSDS*

FIGURE 20

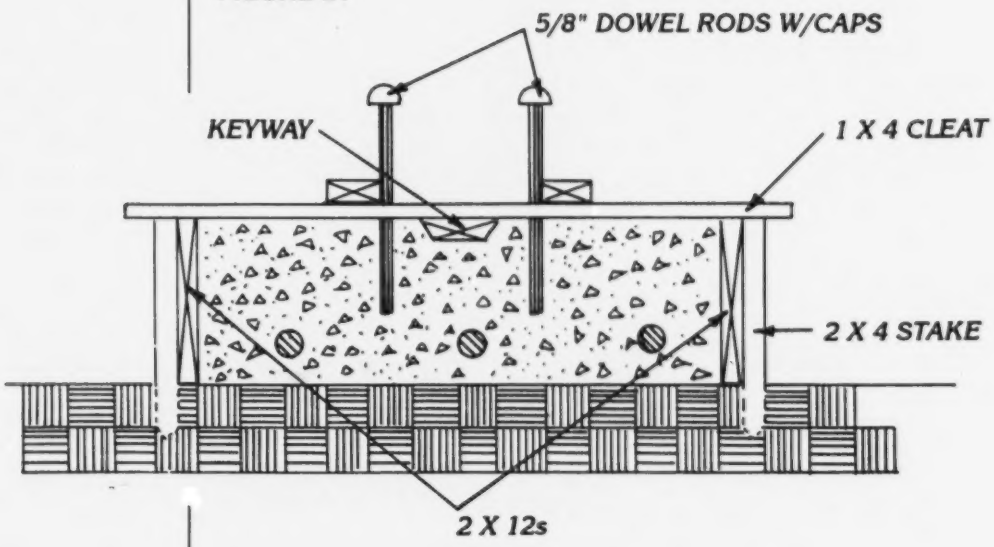


*MSDS = Material Safety Data Sheet

		Yes	No
b.	Set inside footing-form stakes, spacing them approximately 4 feet apart and driving them straight down so that there is no pressure exerted against inside form, which would move outside form out of line.	___	___
c.	Nail inside form boards to grade, checking alignment of boards by using plumb bob attached at different points along string line.	___	___
d.	Nail cleats across top of form. (See Figure 21.)	___	___
e.	Install dowel rods, if specified in the plans.		
	1) Nail 2 × 4 across cleats to support dowel rods.	___	___
	2) Fasten dowels to 2 × 4.	___	___
	3) Nail keyway to cleats if specified. (See Figure 21)	___	___
	NOTE: For ease of placing concrete, dowels and keyway may be installed immediately after concrete is in place.		

Yes No

FIGURE 21



5. Re-check forms for alignment. — —

   NOTE: The tops of the stakes may be cut off flush with the top of the form for ease of finishing the surface of the concrete.

6. Have your instructor check your work. — —

7. Clean up area and put away equipment and supplies. — —

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Use of safety equipment	4	3	2	1
Proper markings of ledger board (± ¼")	4	3	2	1
Square corners (± ¼")	4	3	2	1
Elevation at proper grade (per plot plan)	4	3	2	1
Footing line at proper location	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

votech

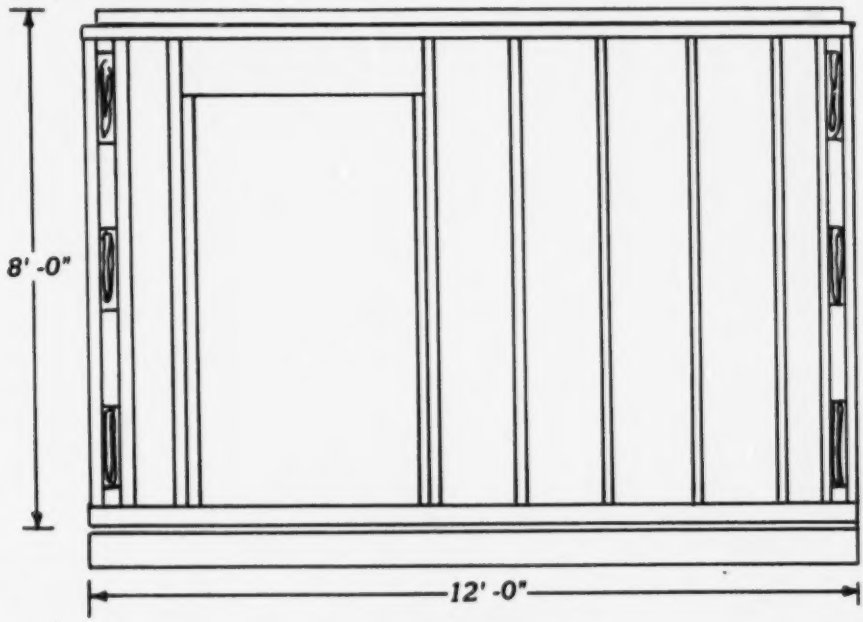
BEST COPY AVAILABLE

JOB SHEET 2	APPLIED SKILLS	A 3

OBJECTIVE 8a

Lay out and construct a wall section for a structure.

FIGURE 22



View of Completed Wall

EQUIPMENT AND SUPPLIES

- Goggles and hard hat
- Chalk line
- 25-foot tape
- Steel tape
- Framing hammer
- Framing square
- 8d nails
- Floor plan (at end of this job sheet)

NOTE: During this job sheet, you will lay out the wall section location on the floor. Use Figures 22 and 24 as guides.

PROCEDURE

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English and metric measures

Data Analysis and Display Skills
- Interpret plans/ blueprints

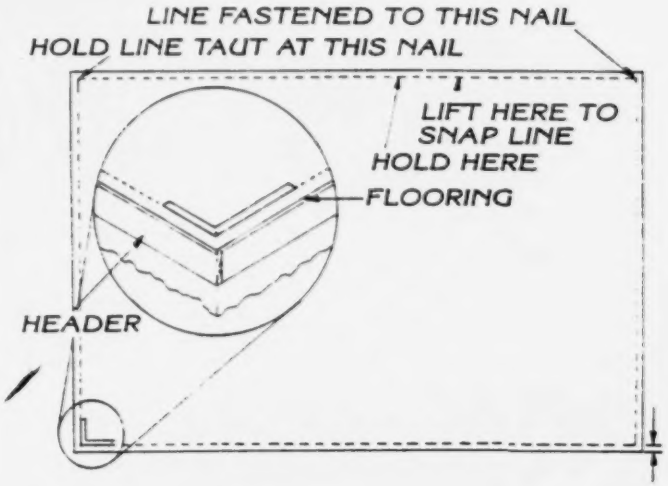
Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments

Cognitive Activity Skills
- Transfer knowledge/ training to new situations

	Yes	No
1. Put on all the appropriate personal protective equipment.	___	___
2. Lay out outside walls.		
a. Measure in the width of the sole plate from the outside edge of the floor on each end of the structure and mark this distance.	___	___
NOTE: On concrete slab construction you must allow for sheathing thickness.		
b. Start a nail at each mark.	___	___
c. Snap a chalk line between the marks.	___	___

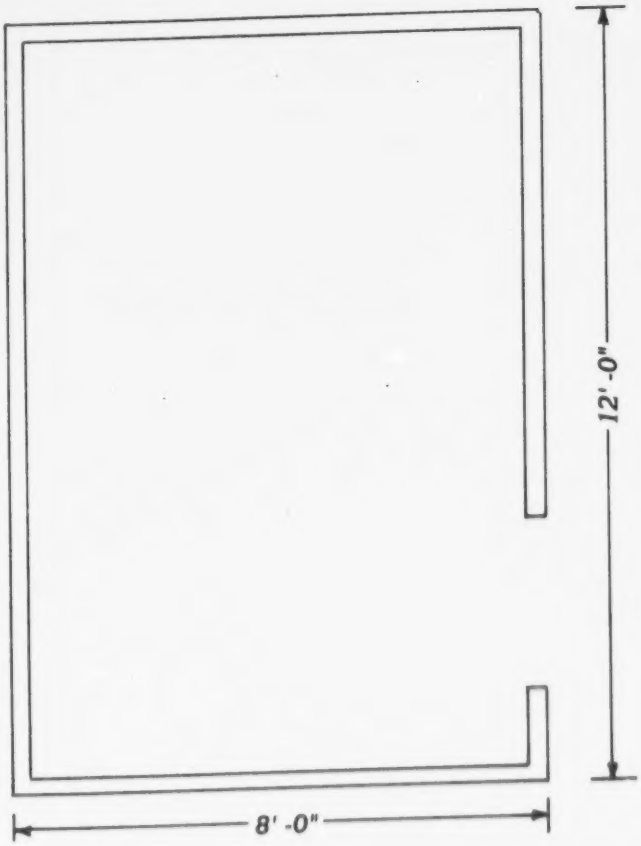
FIGURE 23



Job Acquisition/
Development Skills
- Master specific job task/procedure

	Yes	No
d. Check for squareness of the subfloor by using the 3-4-5 method.	___	___
NOTE: On longer walls, be sure the line is straight and well marked. Secure one end of the line and have someone hold the other end of the line and pull the line tight. Place your thumb on the line approximately in the center. Be sure to hold the line firmly to the floor. Carefully lift one side of the line with your other hand and let it snap to the floor. Repeat this process on the other half of the line.		
e. Mark the other outside walls with the chalk line.	___	___
f. Make sure the outside wall lines are parallel.	___	___
3. This concludes this job sheet. Ask your instructor to evaluate your work.	___	___
4. Clean work area.	___	___
5. Put away all tools and materials.	___	___

FIGURE 24



(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Observed safety procedures	4	3	2	1
Used proper equipment correctly	4	3	2	1
Performed steps in a timely manner	4	3	2	1
Followed instructions	4	3	2	1
Provided satisfactory responses to questions asked	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

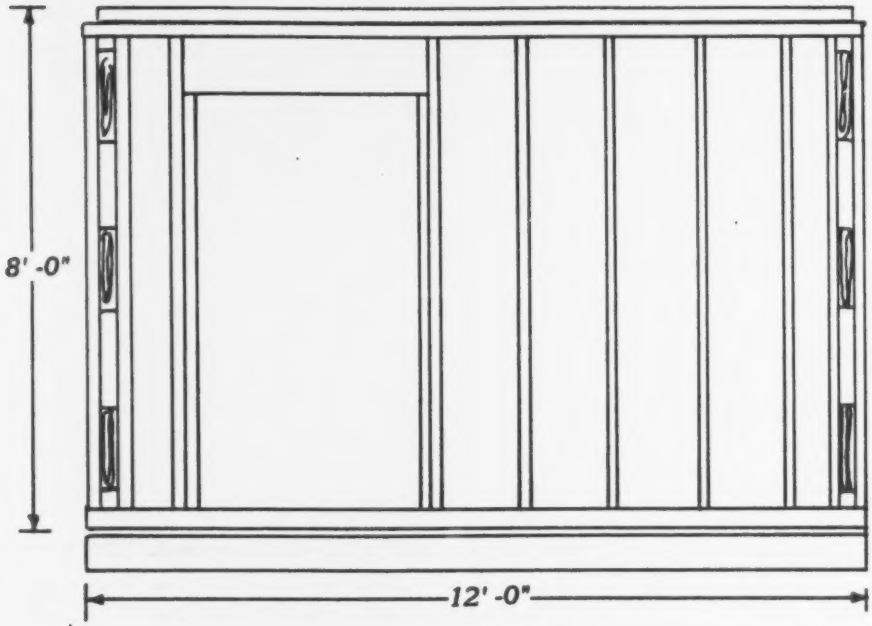
4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 3	APPLIED SKILLS	A 3

OBJECTIVE 8b

Lay out and construct a wall section for a structure. Cut studs, trimmers, and header to dimensions.

FIGURE 25



View of Completed Wall

EQUIPMENT

- Goggles and hard hat
- Steel tape
- Framing square
- 16d box nails
- ½" CD plywood
- Circular saw and extension cord
- Framing hammer
- Available 2×4s or 2×6s
- 2×12s
- Floor plan (at end of Job Sheet 2)

NOTE: The exercise will prepare materials for the construction of a wall section. Studs, trimmer studs, and a header will be cut to dimensions. Use Figure 25 as a guide.

PROCEDURE

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures

Data Analysis and Display Skills
- Interpret plans/ blueprints

Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments

Job Acquisition/ Development Skills
- Master specific job task/procedure

	Yes	No
1. Put on all the appropriate personal protective equipment.	___	___
2. Cutting the studs.		
a. Determine the number of studs needed.	___	___
b. Determine the length of the full studs by subtracting the thickness of the sole plate and the top plate from the wall height.	___	___
c. Measure and mark the length of the full studs.	___	___
d. Using a circular saw, cut the first stud, following safety procedures.		
— Keep the electric cord free of the blade.	___	___
— Be sure the automatic guard is free and retractable.	___	___
— Never lock the automatic guard in the retracted position.	___	___
— Check the stock for nails, metal, or concrete before cutting.	___	___
— Make sure the blade is sharp and in good condition.	___	___

		Yes	No
—	Use good, solid support for the stock while cutting.	___	___
—	Set the blade deep enough to cut through the stock only.	___	___
—	Lay the saw on its base after finishing the cut.	___	___
e.	Remeasure the stud.	___	___
f.	If the stud is the correct length, use the stud as a pattern to cut the rest of the full studs.	___	___
	NOTE: It is important to use straight material for full length studs. Use the less straight material for trimmer studs.		
3.	Cut the trimmer studs.		
a.	Determine the lengths of the trimmers.	___	___
b.	Determine how many trimmer studs of each length are needed.	___	___
c.	Measure and mark the length of the trimmer stud.	___	___
d.	Cut the trimmer stud.	___	___

	Yes	No
4. Cut the material for the door header.		
a. Determine the length of the header needed.	___	___
b. Measure and mark the length of the header on the 2×12 material.	___	___
c. Use the framing square to square a line across the header material.	___	___
d. Cut the header.	___	___
5. Cut spacers for the header from ½" plywood.	___	___
NOTE: Spacers should be cut slightly less than the width of the header, and they should be at least 1½" wide. Three spacers are needed for short headers and more for longer headers.		
6. This concludes this job sheet. Ask your instructor to evaluate your work.	___	___
7. Clean work area.	___	___
8. Put away all tools and materials.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Observed safety procedures	4	3	2	1
Used proper equipment correctly	4	3	2	1
Performed steps in a timely manner	4	3	2	1
Followed instructions	4	3	2	1
Provided satisfactory responses to questions asked	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

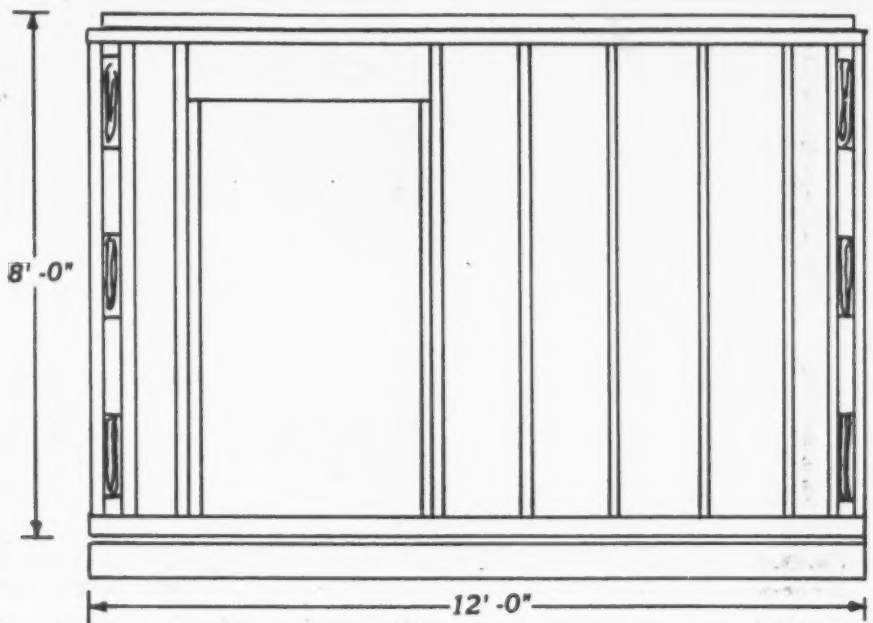
PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

OBJECTIVE 8c

Lay out and construct a wall section for a structure. Assemble corners and header.

FIGURE 26



View of Completed Wall

EQUIPMENT AND SUPPLIES

- Goggles and hard hat
- Circular saw and extension cord
- 2x12 header material cut to length
- ¼" CD plywood cut for header spacers
- Floor plan (at the end of Job Sheet 2)
- Framing hammer
- Studs
- Stock for blocking
- Steel tape
- 16d box nails

NOTE: This exercise will describe the procedure to assemble corners and a header in preparing to construct a wall section. Use Figure 26 as a guide.

PROCEDURE

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures

Data Analysis and Display Skills
- Interpret plans/ blueprints

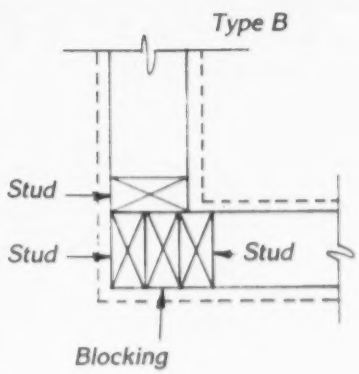
Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments

Job Acquisition/ Development Skills
- Master specific job task/procedure

	Yes	No
1. Put on all the appropriate personal protective equipment.	___	___
2. Construct the corners.	___	___
a. Stack materials in an out-of-the-way but convenient location.	___	___
b. Determine the number of corners needed.	___	___

FIGURE 27



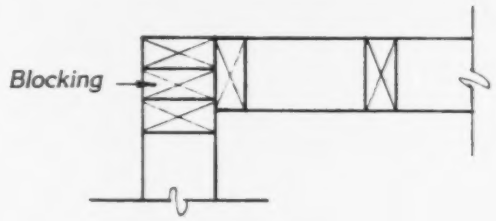
c. Select three of the straightest studs for each corner.	___	___

Yes No

d. Construct the corners as you see them in following illustrations. ___ ___

NOTE: Use scrap material for blocking. Use three blocking pieces that are 10 to 16 inches long for each corner.

FIGURE 28



e. Nail two studs together with blocking in between. ___ ___

3. Construct the header for door way. ___ ___

a. Mark the crown on the header materials. ___ ___

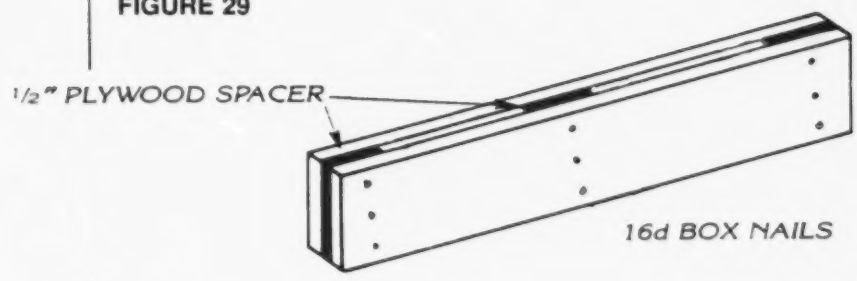
b. Arrange plywood spacers 16 to 24 inches apart along one 2×12. ___ ___

c. Place the second 2×12 on top of the spacers with the edges even with the first 2×12. ___ ___

d. Hold the second 2×12 in place with both crowns up, and drive nails into it. ___ ___

Yes No

FIGURE 29



4. This concludes this job sheet. Ask your instructor to evaluate your work. ___ ___

5. Clean work area. ___ ___

6. Put away all tools and materials. ___ ___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Observed safety procedures	4	3	2	1
Used proper equipment correctly	4	3	2	1
Performed steps in a timely manner	4	3	2	1
Followed instructions	4	3	2	1
Provided satisfactory responses to questions asked	4	3	2	1

EVALUATOR'S COMMENTS

_____

_____

_____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

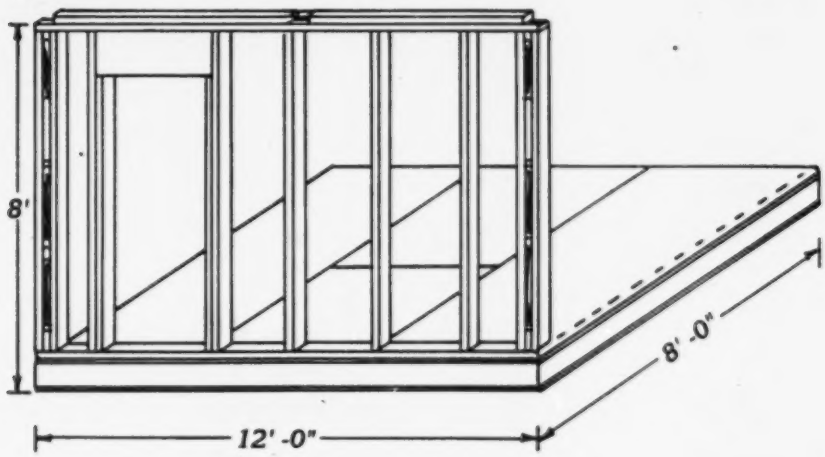
4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 5	APPLIED SKILLS	A 3

OBJECTIVE 8d

Lay out and construct a wall section for a structure. Complete and raise wall section.

FIGURE 30



View of Completed Wall

EQUIPMENT AND SUPPLIES

- Goggles and hard hat
- Steel tape
- Speed square
- Framing square
- Circular saw and extension cord
- 4' level

NOTE: You will be completing and raising the wall section during this exercise. Use Figure 30 as a guide.

votech

BEST COPY AVAILABLE

- 25′ tape marked 16″ on center
- 6′ step ladder
- 8d and 16d nails
- Floor plan (at the end of Job Sheet 2)
- Regular studs
- Corners
- Headers
- Plate material
- Metal strapping brace material

PROCEDURE

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures

Data Analysis and Display Skills
- Interpret plans/ blueprints

Functional Math Skills
- Make measurements

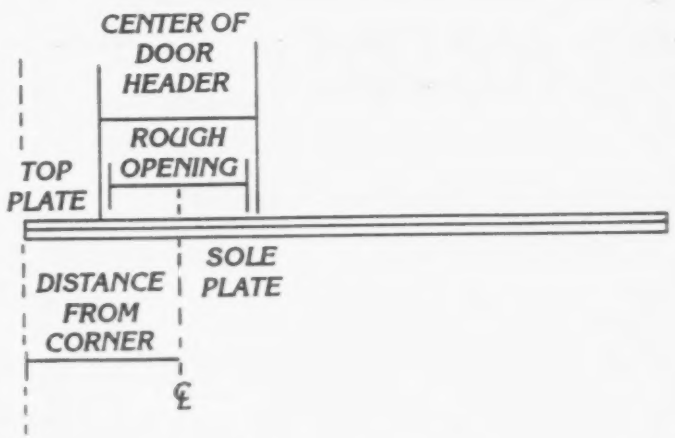
General Science Skills
- Use scientific instruments

		Yes	No
1.	Put on all the appropriate personal protective equipment.	___	___
2.	Plan the sequence for raising the wall.	___	___
	NOTE: The procedure described here is one of several. Use the most efficient and productive for your situation.		
3.	Select materials from stock for the plates.	___	___
4.	Cut the sole plate and top plate for the wall to length, following safety procedures.	___	___
5.	Tack the sole plate and top plate for the wall together and lay them on edge at the wall location.	___	___
6.	From the plans, lay out the following on the plates:		
	a. Rough opening	___	___
	b. Corners	___	___
	c. Stud locations	___	___

Job Acquisition/
Development Skills
- Master specific job task/procedure

	Yes	No
7. Mark the plates for the corners.	—	—
8. Locate the center of the door opening and lay out trimmer stud locations.		
a. Determine the distance from the end of the plate to the center of the opening, according to the plan.	—	—
b. Measure the required distance.	—	—
c. Mark the plate.	—	—
d. Measure ½ the header length on each side of the center of the opening.	—	—
e. Mark the plate.	—	—
f. Mark the trimmer stud locations with a "T."	—	—

FIGURE 31



BEST COPY AVAILABLE

Yes No

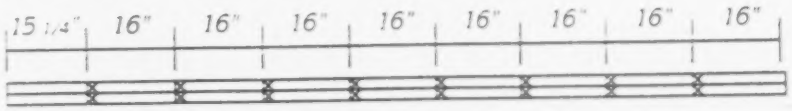
9. Use a tape to lay out all the full stud locations.

   a. Measure 15¼" from the end of the outside corner to the leading edge of the first stud. ___ ___

   b. Drive a nail at this point and hook the end of the tape to the nail. ___ ___

   c. Mark 16" centers and place a small "X" to the far side of each mark. ___ ___

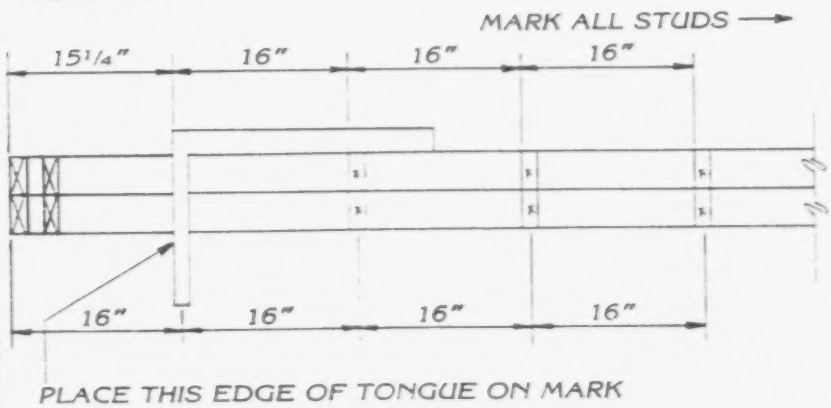
FIGURE 32



   d. Use a square to mark the stud locations across both plates. ___ ___

   NOTE: Splices in the plate must fall at the center of the stud.

FIGURE 33



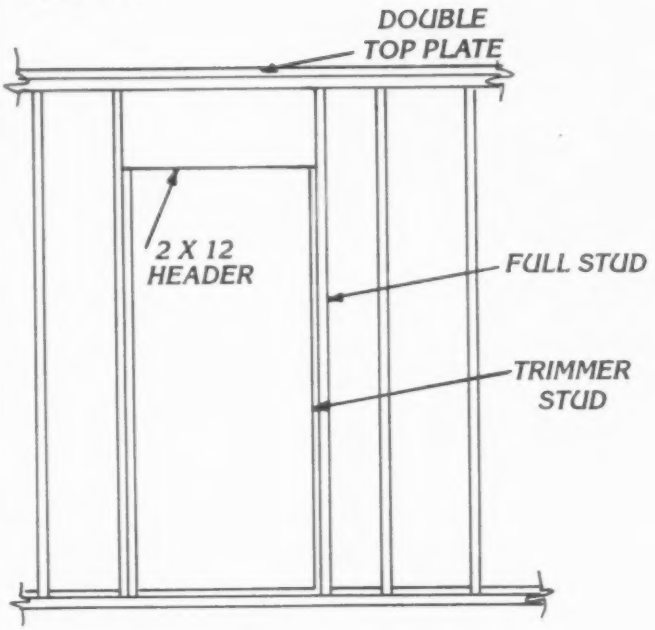
	Yes	No
10. Build the wall with the inside of the wall facing down.	___	___
11. Place the sole plate at the partition line with the marked edge up.	___	___
12. Move the top plate to the approximate stud length.	___	___
13. Lay the studs at each "X" mark.	___	___
14. Check all studs and turn them so that the crown is up.	___	___
15. Put the headers in place.	___	___
16. Place the trimmer studs at each partition "T" mark.	___	___

NOTE: The trimmer studs and headers have been assembled prior to wall assembly.

BEST COPY AVAILABLE

Yes No

FIGURE 34



17. Nail the framework together.

    a. Drive two 16 d nails through the plate into the end of each 2×4 stud. — —

    b. Install the header and trimmers, at door opening. Use 6 to 8 nails driven through studs and plates. — —

    c. Make sure the door opening is square. — —

    d. Ensure the opening is the proper size. — —

	Yes	No
e. Finish nailing the framework together.	___	___
18. Lay out the double top plate.		
a. Start at the corner and lay out the double top plate.	___	___
b. Measure and cut the double top plate. Allow for the overlap of corners.	___	___
c. Install the double top plates by first driving two 16d nails at one end of double top plate.	___	___
19. Drive one 16d nail on each side of the stud locations on opposite sides of the double top plate.	___	___
20. With assistance, raise the wall section and nail it in place.	___	___

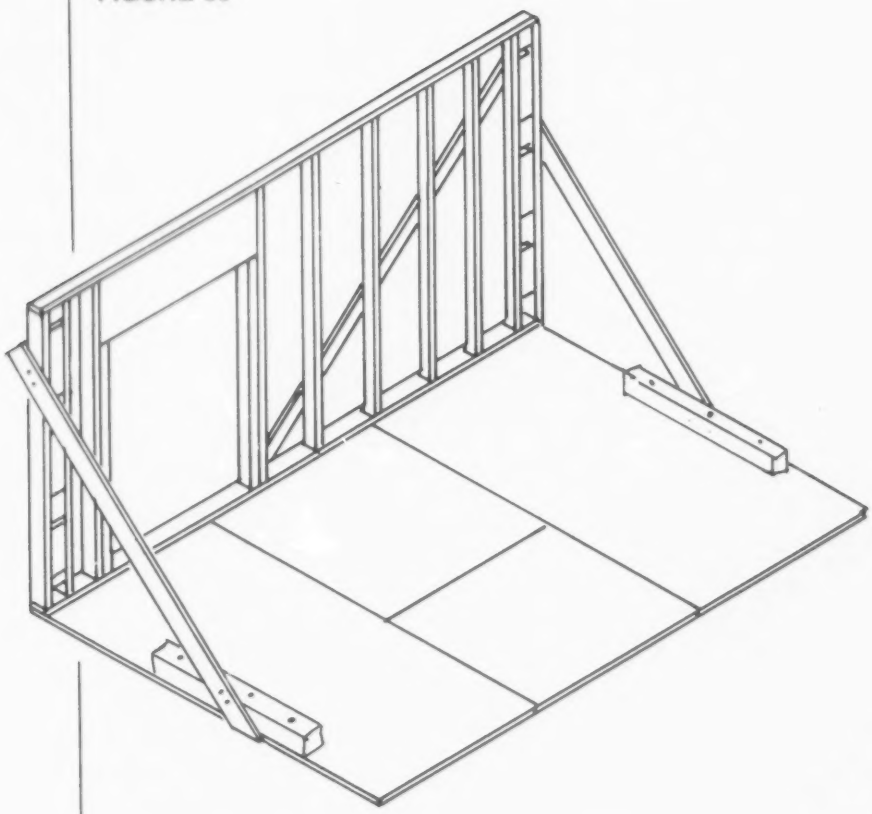
NOTE: To do this on wood floors, use two 16d nails every other floor joist. On concrete slabs, use preset anchor bolts or powder-actuated pins where appropriate. This practice requires special training to ensure their safe use.

CAUTION: Before using a powder-actuated tool, you must be certified and possess a safety certification card.

21. Plumb the corners.	___	___
22. Attach temporary exterior bracing.	___	___

Yes No

FIGURE 35



23. Straighten the wall and nail the temporary bracing in place.

    a. Nail a ¾" block on each corner at the top of the wall. ___ ___

    b. String a line from one end of the wall to the other. ___ ___

		Yes	No
c.	Be sure to stretch the line very tightly, so there is no sag in it.	___	___
d.	Use a ¾" gauge block to check the wall line.	___	___
e.	Adjust and nail the bracing during the straightening process.	___	___
24.	This concludes this job sheet. Ask your instructor to evaluate your work.	___	___
25.	Clean work area.	___	___
26.	Put away all tools and materials.	___	___

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

_____

_____

_____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Observed safety procedures	4	3	2	1

BEST COPY AVAILABLE

Used proper equipment correctly	4	3	2	1
Wall section straight (±1/42")	4	3	2	1
Wall plumb (±1/4-)	4	3	2	1
Wall secured to floor joists	4	3	2	1
Wall members in proper locations (±1/4")	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

WRITTEN TEST	APPLIED SKILLS	A 3

Name _____ Score _____

OBJECTIVE 1

Given a list of terms associated with layout, match them to their correct definitions. Write the letter that corresponds to the most correct answer.

_____ 1. A slight indention made with a saw to hold a line in place on a batter board is

a. kerf
b. slot
c. line slot
d. batter knotch

_____ 2. What is the term used to describe the boundaries of a lot or plot of ground?

a. Easement
b. Building line
c. Setback line
d. Property lines

_____ 3. Which of the following terms describes a temporary framework used to assist in locating corners and building lines?

a. Plumb bob
b. Batter board
c. Transit
d. Grade frame

_____ 4. The soil used to raise a grade is called

a. elevation
b. fill
c. leveling material
d. layout dirt

May be photocopied for student use.

_____ 5. A drawing used to show the location and size of structure(s), driveways, and property lines is referred to as a _____ plan.

a. building
b. easement
c. plot
d. survey

_____ 6. The slope of a line is called

a. fall
b. grade line
c. slant
d. lay

_____ 7. Which of the following terms describes a method(s) to ensure the squareness of building lines, foundations, and/or structures?

a. 3-4-5 method
b. Diagonal method
c. Transit method
d. All the above

_____ 8. The term used when measuring from the center of one framing member to the center of the next is called

a. on-center or center to center
b. outside to center
c. center to middle
d. center to wall or center to center

_____ 9. A small box filled with colored powder used to make a line is called a/an

a. string line
b. speed box
c. chalk box
d. powder box

May be photocopied for student use

_____10. A small triangle shaped tool often used to mark lumber for cutting is called a/an

a. level
b. speed square
c. rule
d. "L" scale

_____11. The layout mark used to indicate the placement of a cripple stud is/are the character(s)

a. R
b. CS
c. ZZ
d. C

_____12. Which term is used for an opening framed in a wall to receive a window or door?

a. Rough opening
b. Frame gap
c. Framing square
d. Extension frame

_____13. A small board used to join formwork members is called a

a. keyway
b. keystone
c. block
d. cleat

_____14. The wood or metal cylinder inserted to holes in adjoining members to align and strengthen the joint is a

a. cleat
b. dowel
c. leader
d. tang

May be photocopied for student use.

OBJECTIVE 2

Provided with a list of alternatives, distinguish factors that contribute to inaccurate layout.

_____ 1. A factor that contributes to inaccurate layout is

a. using the 3-4-5 method of squaring
b. using a speed square
c. leaving slack in tape
d. using layout marks

_____ 2. This layout can be inaccurate if

a. the pencil is dull
b. a rule is used instead of a tape
c. using a speed square instead of a combination square
d. using a rule with metric and Arabic numbers

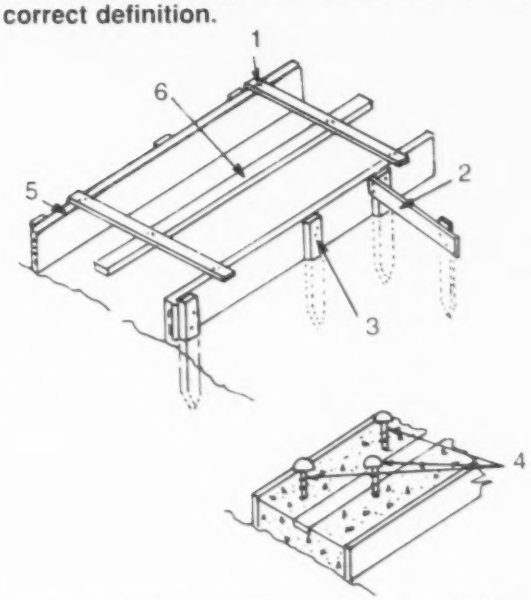
_____ 3. All of the following practices contributes to an inaccurate layout EXCEPT

a. using the square backwards
b. misaligning tape, rule, or square
c. keeping the square tight against the workpiece
d. using a speed square instead of a combination square

May be photocopied for student use.

OBJECTIVE 3

Provided a drawing, match the parts of a footing form to their correct definition.



_____ 1. The part identified by the #1 in the above drawing is called a

a. brace
b. spreader
c. keyway
d. REBARS

_____ 2. What is form part #5?

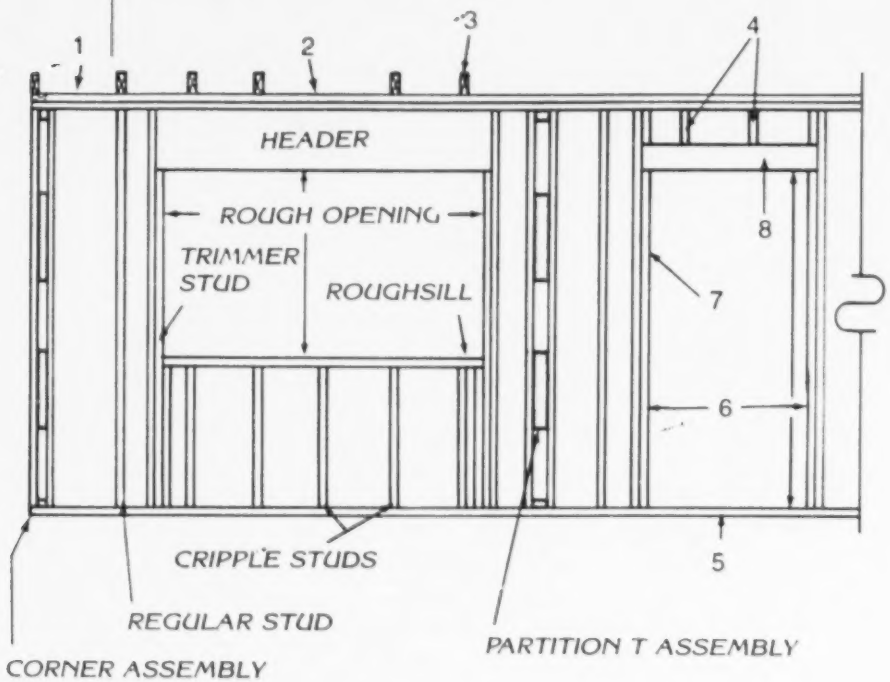
a. 2X sheathing
b. Form stakes
c. Keyway
d. Brace

_____ 3. The identity of form part #3 is

a. spreader
b. brace
c. REBAR
d. form stake

May be photocopied for student use

OBJECTIVE 4 **Given a drawing, choose the framing members in a wall, partition, and ceiling.**



_____ 1. The framing member identified by #3 in the drawing above is

a. top plate
b. ceiling joist
c. header
d. stud

_____ 2. What is the name of the framing members identified by #4?

a. Trimmer studs
b. Headers
c. Cripple studs
d. Studs

May be photocopied for student use

_____ 3. Name the framing member identified by #8.

a. Cripple stud
b. Header
c. Sole plate
d. Trimmer stud

_____ 4. A full header is

a. used for small openings
b. a metal or wood vertical member
c. attached to the bottom of the top plate
d. used to strengthen the frame around a rough opening

_____ 5. Joists

a. form the wood or metal vertical frame
b. attach flooring and ceiling material
c. strengthen the frame around a rough opening
d. attach to the bottom of the header

_____ 6. Partition Ts are tied in with

a. three 2x4 studs and blocking
b. four 2x6 studs and blocking
c. three 2x4 or 2x6 studs and blocking
d. four 2x4 or 2x6 studs and blocking

_____ 7. The straightest, least defective studs are used for

a. trimmer studs
b. headers
c. ceiling joists
d. corner assemblies

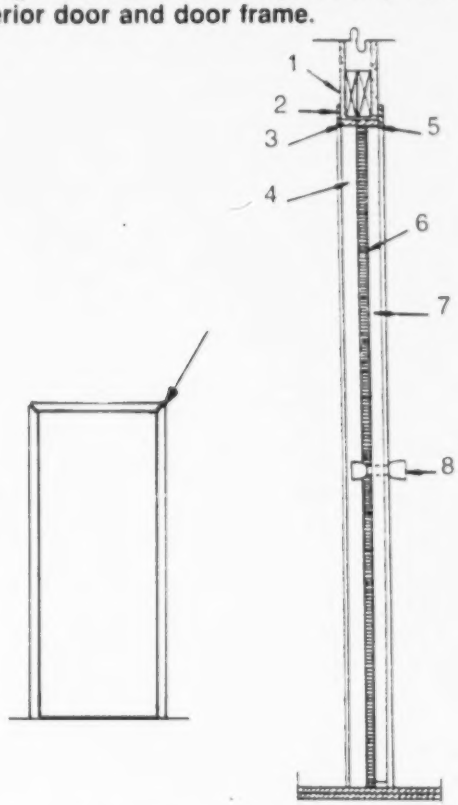
_____ 8. Trimmers are

a. used to strengthen the frame around a rough opening
b. made from hardwoods
c. horizontal support members
d. attached to the bottom of the top plate

May be photocopied for student use.

OBJECTIVE 5 **Evaluated through the completion of an assignment sheet.**

OBJECTIVE 6 **Using a numbered drawing, identify the major elements of an interior door and door frame.**



_____ 1. The element identified by the #4 above is a/an

a. head jamb
b. doorstop molding
c. side jamb
d. door

_____ 2. Number 8 identified in the drawing is a/an

a. door catch
b. doorstop
c. lockset
d. door frame

May be photocopied for student use

_____ 3. What is the element denoted by the #6 in the drawing?

a. Door
b. Doorstop molding
c. Door clearance
d. Interior casing

NOTE: Objectives 5, 7-8 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS	APPLIED SKILLS			A 3
OBJECTIVE 1	1. a	6. a	11. d	
	2. d	7. d	12. a	
	3. b	8. a	13. d	
	4. b	9. c	14. b	
	5. c	10. b		
OBJECTIVE 2	1. c			
	2. a			
	3. c			
OBJECTIVE 3	1. b			
	2. a			
	3. d			
OBJECTIVE 4	1. b	5. b		
	2. c	6. c		
	3. d	7. d		
	4. c	8. a		
OBJECTIVE 6	1. c			
	2. c			
	3. b			

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) INTRODUCTION TO CARPENTRY

UNIT NUMBER AND TITLE – A1 – CARPENTRY MATERIALS

TOTAL NUMBER OF TEST QUESTIONS 62

TOTAL NUMBER OF BASIC SKILL QUESTIONS 2

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	1-4, 6-9, 11-15	X
1	5, 10	S
2	1-10	X
3	1-13	X
4	1-5	X
5	1-6	X
6	1-4	X
7	1-5	X
8	1-4	X

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) INTRODUCTION TO CARPENTRY

UNIT NUMBER AND TITLE – A2 – CARPENTRY TOOLS

TOTAL NUMBER OF TEST QUESTIONS 45

TOTAL NUMBER OF BASIC SKILL QUESTIONS 0

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	1-15	X
2	1-15	X
3	1-5	X
4	1-10	X

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) INTRODUCTION TO CARPENTRY

UNIT NUMBER AND TITLE – A3 – APPLIED SKILLS

TOTAL NUMBER OF TEST QUESTIONS 31

TOTAL NUMBER OF BASIC SKILL QUESTIONS 0

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	1-14	X
2	1-3	X
3	1-3	X
4	1-8	X
5	Evaluated on assignment sheet	
6	1-3	X

INTRODUCTION TO CARPENTRY (Second Edition)
COMPETENCY PROFILE

Student _____ Soc. Sec. No. ___ – ___ – ____
Last First MI

PROGRAM Grade 9 10 11 12 Adult SCHOOL

INSTRUCTOR SCHOOL ADDRESS PHONE

STUDENT'S HOME ADDRESS DATE OF BIRTH PHONE

STUDENT'S EMPLOYER ADDRESS PHONE

CONTACT IN CASE OF EMERGENCY PHONE

ADDRESS

OR

ADDRESS PHONE

The above information can be used for school records and/or to ensure safety of students. This confidential information is not to be released to employers or to the general public.

ON-THE-JOB TRAINING/WORK EXPERIENCE

DURATION OF EMPLOYMENT	JOB TITLE	EMPLOYER	SUPERVISOR'S NAME	ADDRESS OF EMPLOYER	PHONE

This agency does not discriminate on the basis of race, creed, color, national origin, sex, age, veteran status, qualified handicap, or disability.

Duplicate one copy for each student.

SPECIFIC JOB COMPETENCIES

DIRECTIONS: Evaluate the trainee using the rating scale below, and check the appropriate number to indicate the degree of competency. The numerical ratings of 4, 3, 2, 1, and 0 are not intended to represent the traditional school grading system of A, B, C, D, and F. The descriptions associated with each of the numbers focus on level of student performance for each of the tasks listed below.

Rating Scale:
4 — Skilled — can perform job independently with no additional training.
3 — Moderately Skilled — has performed job independently during the training program; limited additional training may be required.
2 — Limited Practice — has practiced job during training program; additional training is required to develop skill.
1 — Exposure Only — general information provided with no practice time; close supervision needed and additional training required.
0 — No Exposure — no information or practice provided during training program; complete training required.

UNIT I

4	3	2	1	0

Carpentry Materials

1. Given a list of terms associated with wood products, match them to their correct definitions.
2. Given a list of alternatives, identify wood characteristics by their definitions or by their representative drawings.
3. Given alternatives, match the type of wood to its correct use.
4. Differentiate between the various grades of wood.
5. Given a brief description, differentiate plywood types and grades.
6. Given a brief description, match types of wood paneling.
7. Provided a drawing, select the various types of trim and molding.
8. Given pictures, identify common fasteners and their primary uses.
9. Compute lumber quantities.
10. Write a lumber requisition.
11. _____

WRITTEN TEST SCORE _____

UNIT II

4	3	2	1	0

Carpentry Tools

1. Given a list of terms associated with carpentry tools, match them to their correct definitions.
2. Given a list of alternatives, select guidelines for shop and tool safety.
3. Given a picture, choose the appropriate and safe use of selected carpentry tools.
4. Choose the word or phrase to complete statements about the appropriate and safe use of power tools.
5. Complete a safety test for selected power tools.
6. Use a hammer.
7. Use a handsaw.
8. Use a hacksaw.
9. Use a framing square and rule to lay out a corner.
10. Use a level.
11. Perform a ripping operation with a circular saw.
12. Drill holes in wood stock.
13. Operate a pneumatic fastener.
14. _____

WRITTEN TEST SCORE _____

UNIT III

4	3	2	1	0

Applied Skills

1. Given a list of terms associated with layout, match them to their correct definitions.
2. Provided with a list of alternatives, distinguish between practices that contribute to inaccurate layout.
3. Provided a drawing, identify the parts of a footing form.
4. Provided a drawing, identify the framing members in a wall, partition, and ceiling.
5. Compute the size of framing members and rough openings.
6. Using a numbered drawing, identify the major elements of an interior door and door frame.
7. Lay out and construct forms for a continuous footing.
8. Lay out and construct a wall section for a structure.
   a. Lay out wall section located on floor.
   b. Cut studs, trimmers, and header to dimensions.
   c. Assemble corners and header.
   d. Complete and raise wall section.
9. _____

WRITTEN TEST SCORE _____

Use of This Document

Use of this document can be used to record information about the student and the skills mastered by the student. This information is useful in documenting student progress during the training program and to provide information about the student's qualifications to potential employers and for entry into advanced training programs. Instructors using AGC-CIMC instructional materials are authorized to reproduce this document as required for use in their training programs.

INTRODUCTION TO CARPENTRY
(SECOND EDITION)

READING SKILLS

UNITS OF INSTRUCTION	Reading Comprehension										Research and Reference										Functional Reading										Language		Composition			
	Gain factual information	Distinguish fact, opinion and inference	Recognize stereotyping and bias	Recognize propaganda	Analyze cause and effect	Draw conclusions	Make generalizations	React to written material	Apply word analysis techniques		Select useful resources	Locate resources	Find materials in library	Use standard references	Use in-book reference tools	Use audiovisual media	Use computer data base	Use magazines and newspapers			Interpret forms and records	Follow written instructions	Interpret graphics and symbols	Use content area vocabulary	Interpret abbreviations/acronyms	Read aloud					Use standard grammar and correct spelling, punctuation, and capitalization	State ideas clearly	Use complete sentences	Develop preliminary outline	Use topic sentences	Use introductory/closing paragraphs	Compose reports	Compose essays
Carpentry Materials									●												●	●												
Carpentry Tools									●													●	●	●										
Applied Skills														●								●	●											

CIMC BASIC SKILLS DOCUMENTATION MA

WRITING SKILLS

MATH SKILLS

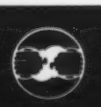
...sition	Research	Functional Writing	Operation and Calculation	Math Application	Data Analysis and Display
Compose reports	Take notes	Complete forms and records	Round off numbers	Solve word problems	Interpret charts and tables
Compose essays	Use notecards	Write instructions	Estimate answers	Select/apply mathematical formula	Interpret graphs (type)
Proofread and edit	Create bibliography	Write letters	Use scientific notations	Select/apply mathematical procedure	Collect /record data
Construct graphics and symbols	Use footnotes	Write job applications	Use exponential notations	Use English and metric measures	Apply sampling techniques
	Outline material	Write resumes	Calculate with whole numbers	Solve time/rate/distance problems	Apply principles of probability
		Use word processing	Calculate with fractions	Solve ratio-proportion problems	Construct charts and tables
		Use computer graphics	Calculate with decimals	Solve percent problems	Construct graphs
			Convert whole numbers to fractions	Apply techniques of scaling	Calculate statistics
			Convert whole numbers to decimals	Apply algebra principles	
			Solve numerical expressions	Apply geometry principles	
			Solve formulae and equations	Apply trigonometry principles	
			Obtain squares and square roots		
			Convert units of measure		
			Perform metric calculations		

ATRIX

SCIENCE SKILLS

94-010508

	Functional Math												General Science												Life Science												Physical Science												Earth Science											
	Calculate statistics	Interpret statistics	Interpret blueprints/plans	Make measurements	Perform banking transactions	Make change	Solve practical problems	Calculate gross earnings	Solve income/expense problems	Prepare a budget	Calculate interest	Solve interest problems	Calculate sales tax	Determine income tax	Use calculator for computation	Use computer for computation	Use computer spreadsheets	Apply computing skills	Apply scientific method of inquiry	Conduct experiments	Investigate science ethics	Investigate science history	Investigate/apply economics in technology	Use scientific instruments	Investigate/apply technology	Collect specimens	Identify/classify living organisms	Investigate biological history of the earth	Investigate food chains, webs, pyramids	Investigate/apply principles of human development	Investigate/apply principles of genetics/heredity	Investigate/apply principles of anatomy/physiology	Investigate health issues	Analyze/classify matter	Investigate forms/changes of matter	Investigate forms/changes of energy	Investigate/apply chemical properties	Investigate/apply physical laws	Investigate physical characteristics of the earth	Investigate geological history of the earth	Investigate physical forces acting on the earth	Solve problems of longitude, latitude, and time zones	Investigate conservation of physical resources	Investigate conservation of living resources	Investigate issues of environmental impact	Apply science principles to environmental issues
			●	●														●	●					●	●													●																



ORAL COMMUNICATION SKILLS

INTERPERSONAL OR REL SKILLS

UNITS OF INSTRUCTION

| | Oral Presentation | | | | | | | | | | Listening | | | | Interactive Communication | | | | | | | | | | General Relating | | | | | | | | | |

RELATING

CREATIVE THINKING/ PROBLEM SOLVING SKILLS

EMPLOYABILIT

Teamwork/ Cooperation	Leadership/ Influence	Cognitive Activities	Job Search Selection	Job A Dev
Select/apply appropriate behavior	Analyze/apply leadership styles	Collect/record information	Analyze personal occupational aptitudes/preferences	Master specific job task/procedure
Investigate/identify personal styles	Analyze/apply management styles	Identify critical elements/issues	Investigate employment prospects of a career field/occupation	Fill in job-related applications
Investigate/identify group/corporate climate	Obtain confidence of others	Define a problem	Investigate training requirements for a career field/occupation	Write letter of application
Give/receive feedback	Develop esteem in self/others	Identify underlying causes	Investigate benefits of a career field/occupation	Write personal resume
Identify hidden purposes	Persuade others	Apply a problem-solving model	Compare/evaluate career options	Interview for a job
Investigate/apply group dynamics	Analyze/apply motivation techniques	Analyze/synthesize information	Develop personal career path	Apply business etiquette
Control undesirable/inappropriate behavior	Provide positive coaching	Identify/analyze underlying assumptions	Locate appropriate jobs	Practice good work habits/attitudes
Resolve conflicts		Draw conclusions	Analyze duties/requirements/benefits of specific job	
Clarify goals/objectives		Predict results/outcomes		
Devise "win/win" situations		Identify/evaluate consequences		
Build consensus		Identify/develop alternatives		
Generate ideas		Evaluate alternatives		
Present point of view		Select an alternative		
		Devise a solution		
		Create a finished product		
		Apply intuitive/creative thinking processes		
		Transfer knowledge/training to new situations		
		Apply new technology		
		Develop an action plan		
		Evaluate results/outcomes		

BILITY SKILLS

SOCIAL STUDIES SKILLS

| Job Aquisition / Development | | | | | | | | | | Information Analysis | | | | | Social Studies Application | | | | | | | | | | | | | | | Functional Social Studies | | | | | | | | | | | | | | |